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Original Article

TREATMENT OF TYPHOID FEVER IN CHILDREN

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TYPHOID FEVER in children exhibits certain important differences from the same disease in adolescents or adults. Before the age of twelve severe hæmorrhage and perforation of the intestine are exceptional; on the other hand cerebral symptoms, meningismus, delirium or coma are prominent features, as also is the tendency to respiratory complications. The writer saw in the course of one week no less than five cases exhibiting some degree of meningismus. A happy feature in the young, however, is a singular capacity for recovery even in the most desperate cases. As an illustration may be quoted the recovery of a girl of 12 years, who had 84 days of fever including a relapse, who was semi-conscious for a month, whose temperature at times rose above 105°F. , and who developed pneumonic patches in both lungs.

Until comparatively recent times the treatment of typhoid centred on the prevention of perforation or hæmorrhage, by methods now considered to be of doubtful value, with the result that it is probable that a considerable proportion of patients succumbed to starvation rather than to the actual rigours of the disease. It is clear that a diet insufficient to stabilize wastage will increase these risks by allowing the bowel wall to become thin from starvation atrophy. The starvation treatment is still more dangerous in children, as it will increase the liability to pneumonia and heart failure. Starvation states are particularly badly borne by the young, as there is less stability in the blood-sugar content, and with its fall tachycardia, heart exhaustion, and acetonaemia will develop.

Briefly then, the first consideration in the treatment of typhoid fever is the maintenance of nutrition. In parenthesis, the writer may be allowed to refer to an important diagnostic sign, hitherto, as far as he is aware, not recorded. This sign is the perceptibly higher temperature of the skin over the abdomen, as compared with other parts of the body; it is especially prominent in children.

The maintenance of nutrition

It is estimated that the caloric requirements to maintain equilibrium are 40 per cent higher than in the normal, to be made up almost exclusively in protein and carbohydrate. The assumption that the carbohydrate content is the

more immediately necessary is based on the striking improvement that may be observed when the deficiency—as evidenced by increased rapidity of the pulse, increased prostration, and acetonaemia—is made up. Actually there are difficulties in the way of administering food in a figure anything approaching the theoretical requirements. Of these, the first and almost universal one is the loss of appetite, often associated with complete indifference to the surroundings. Nausea is sometimes troublesome, and finally the digestion, throughout the alimentary canal, is impaired, with a tendency to distension or the development of diarrhoea. Briefly, the food must be pushed to the limit of tolerance keeping a watch for the development of distension or diarrhoea. In doing this it is advisable to keep a measured account of what the patient takes, preferably in terms of calories.

The choice of food lies between glucose, glucose-D, lactose, and Mellin's food, a pure dextro-maltose. The writer prefers the last-named as less likely to give rise to fermentation and distension, and, during the acute stage, prescribes this food in the proportion of one heaped teaspoonful to two ounces of whey. The protein requirements are met by whey or skimmed milk. Should this not be tolerated peptonized skimmed milk may be tried again, with Mellin's food added cautiously.

There is scope for observation on the value of acidified skimmed milk, so valuable in certain other forms of failure of digestion, but there are practical difficulties in the way; lactic acid milk demands skilled preparation and its effective substitute, Lacidac, is not always available.

Finally, a few drops of Radiostoleum are given daily, as soon as it can be tolerated.

Prevention of dehydration

The second and equally important desideratum is the prevention of dehydration. Dehydration must be regarded as an impending danger in all cases, the child is seldom thirsty, is indifferent to all externals or semi-conscious, and the inadequacy of the fluid ingested often passes unnoticed. In one case under the writer's care, admitted to hospital on the 10th day of the disease, the specific gravity of the blood was found to be 1064, necessitating the administration of intravenous saline. The amount actually taken should be measured and if this falls below the necessary quantity, a rectal saline may be given. Rigid figures are unsatisfactory, but the amount aimed at should be proportionate to the estimated adult requirement of six pints a day. The true proof of sufficiency lies in the maintenance of a free flow of urine and a reasonable degree of moisture of the tongue. There is no objection to iced fluids; on the contrary they are pleasing to the patient and help to keep the temperature within moderate limits.

Control of the temperature

Experience in private houses, where skilled nursing is seldom available and the fever is left to look after itself, has led us to doubt the desirability of undue interference with the temperature. Tepid sponging is soothing when the temperature is in the neighbourhood of 104°F. and should be carried out regularly, but the more drastic application of ice packs should be reserved for those cases approaching hyperpyrexia. The ice cap is often abused and applied to the head continuously for days together, to the discomfort of the patient and with the effect of dulling the central nerve centres. In young children with high fever, it is preferable that the ice cap should be placed near and not actually in contact with the head.

Measures taken to reduce the temperature of the surrounding air are of value; these may consist of placing the patient in an ice cradle, which may easily be rigged up, or allowing a fan to play on blocks of ice.

The prevention and treatment of complications

Distension of the abdomen.—In all cases there is liability to distension, which, in minor degree, may be treated by adjusting the diet. Severe distension, however, constitutes a danger, not only increasing the liability to perforation, but, in children especially, inducing complications in the lungs. In addition to direct interference with the movements of the diaphragm and direct pressure on the lung, the abdomino-pulmonary reflex, peculiarly active in childhood, is set up with spasm of the bronchi, the result of which is broncho-pneumonia and collapse. In such cases active measures must be taken; an asafœtida enema with turpentine stupes may be tried, but it will in all probability be necessary to resort to the injection of pituitrin, minims 1-3 according to age, two hourly, assisted by the passage of a flatus tube. In all cases the carbohydrate content of the diet must be reduced temporarily and, in the more severe, it is wiser to withhold all nourishment except water for twelve hours. The cause is often to be found in the administration of too much carbohydrate in the form of barley water or glucose, or in the indiscriminate use of sodium bicarbonate. Distension also occurs when the carbohydrate content is low, and must be presumed to be toxic in origin, or due to adrenal exhaustion. In such cases the exhibition of pituitrin is especially indicated.

Nervous symptoms.—Though not essentially dangerous, these are a sign of increasing prostration and react unfavourably on the course of the disease in that they render nursing and the maintenance of nutrition more difficult. Meningismus, with stiffness at the back of the neck, head retraction and some rigidity of the limbs, may give rise to the suspicion that the meninges are organically involved. Coma or semi-coma may be persistent, or there may be

low delirium. The first indication in such conditions is stimulation, especially when accompanied by a weakening of the first heart sound. The appropriate stimulants are discussed below under the heading 'heart failure'. In the experience of the writer, colloidal calcium has peculiar virtue when there is affection of the central nervous system, whatever form it may take, but especially in delirium. The dose selected is from 0.5 to 1 c.cm. according to age, injected intramuscularly for six days if necessary. In the presence of coma, the urine should be tested for acetone and, if the result is heavily positive, steps should be taken for its neutralization by the administration of glucose by whichever route may seem the most appropriate. At the same time it may be stated that acetone should not be allowed to accumulate in quantity and will not do so if carbohydrate absorption is maintained.

In spite of all difficulties an adequate supply of food and water must be administered and it may be necessary to resort to nasal feeding.

Respiratory symptoms.—In childhood with the active reflexes between the abdominal and pulmonary organs it is not surprising that bronchitis and broncho-pneumonia present themselves as frequent and formidable complications. The development of such complications is undoubtedly encouraged by the traditional method of nursing typhoid patients flat on the back. Children often show a tendency to roll to one side or the other, and should not be prevented from doing so. When the abdominal condition is acute, particularly when there is distension, they will remain prone and in such circumstances it is desirable that they should be placed in Fowler's position.

Posture, nutrition, and stimulation form the basis of treatment; mild expectorants are of value, but must be exhibited cautiously for fear of causing nausea. The importance of atropine (grs. 1/500 to 1/300 hypodermically to a child of 7) must be stressed. It is particularly indicated where there is any massive consolidation or evidence of collapse and when the expiration is prolonged.

Occasionally the respiration, even where there is no pulmonary lesion, becomes markedly irregular or Cheyne-Stokes in character. This condition is an indication for the exhibition of strychnine. Finally, it must be remembered that rapid deep respiration is a sign of acetonaemia of a severe grade.

Heart failure.—It is necessary to maintain a constant watch for either the gradual diminution of the first sound or an increase in the pulse rate. Such signs are induced by toxæmia, by reduction of the blood sugar or by water starvation. Tincture of ephedra is found to be the best of all stimulants, acting as it does in febrile and toxic states by direct stimulation to

the heart muscle nicely balanced with increased vascular tone. It is well tolerated by children and the dose is proportionate to age, the adult dose being one drachm six hourly. A further important effect of this drug is the abolition of bronchial spasm. Adrenalin is useful in case of collapse, but should not be given over long periods owing to a toxic action on the heart muscle.

The timely administration of intravenous glucose (10 c.cm. of a 25 per cent solution to a child of 8) may be instrumental in changing the whole outlook of the case. The writer has found that repeated injections are apt to raise the blood sugar unduly, so it is preferable after the first injection to follow any subsequent injection by giving its equivalent of insulin.

Diarrhœa.—This is a sign of intolerance to the diet and is especially liable to arise if excessive fat, such as is contained in unskimmed milk, is given. Consequently, the first step is the readjustment of the diet followed by the administration of bismuth carbonate should the condition persist. Alkalies, often given as a routine, may be found responsible.

Constipation.—This also is frequently troublesome, partly owing to the somewhat parietic condition of the bowel and partly owing to the absence of the normal roughage in the diet. Many of our patients have been purged during the early days of the disease before diagnosis was established and, though this is sometimes a subject for lamentation, it is by no means clear that this procedure has done anything but good. At the end of the first week, milder methods are used, such as the glycerine or olive-oil enemata, but in addition liquid paraffin may be given provided that it is administered at least half an hour before food; otherwise it may increase gas formation and distension.

Nausea.—This is not infrequent and is troublesome as it hinders the maintenance of nourishment. An injection of atropine—grains 1/500 upwards, according to age—combined with the application of a dilute mustard plaster (mustard one part, flour four parts) for ten minutes, will give relief.

Pyelonephritis.—The infection of the urinary tract with either pure *B. coli* or *B. coli* combined with *B. typhosus* is so common that it may be considered as an ordinary feature of the disease and that prophylactic treatment at the end of the third week is demanded. The condition may be suspected at any time after the end of the third week, if the temperature chart changes type and becomes irregular with high rises of short duration. An examination of the urine will confirm the suspicion. The administration of alkalies sufficient to keep the urine alkaline should be effective in preventing the development of a bacilluria. For older children who can swallow a capsule, the addition of suflavine, grs. $\frac{1}{4}$ to $\frac{1}{2}$, twice a day is advisable.

Where a capsule is inadmissible and infection has occurred, after a full course of alkalies hexamine is employed, but is, of course, ineffective in anything but an acid medium.

Acidosis.—The danger of acidosis is exaggerated, but, if the diet is not well regulated, acetonaemia will occur. In the otherwise normal child, acetone must reach a high degree of concentration before symptoms of poisoning arise, but, in the child with a deranged nervous system, the minimum concentration is doubtless lower. Further, the accumulation of acetone is a sign of sugar shortage. Whichever factor is the more potent in producing an ingravescence of symptoms, the indication is the same, and any marked acetone reaction in the urine should prompt an increase in the carbohydrate section of the diet. Acetonaemia may arise even in convalescence as in the case of a boy of nine who during convalescence suddenly became ill with fever, rapid pulse and hurried respiration. A relapse of the disease was out of the question as the Widal reaction was over 1/2000. The ingestion of glucose in liberal quantities rapidly brought the patient to the normal.

Deafness.—This is a symptom about which the physician is frequently consulted as to prognosis. In the majority of cases, provided there is no actual lesion of the middle ear, the sense of hearing is not permanently impaired.

Infection by Asearis lumbricoides.—Though not strictly speaking a complication, this infection is apt to increase the gravity of the symptoms, particularly those of the nervous system, and, further, clinical observations suggest that such parasitic infection increases or prolongs the fever. Occasionally, when the temperature rises high, there is a spontaneous evacuation of worms. It is clearly desirable to remove the parasites, but the process involves some difficulty owing to the necessity of a free evacuation of the bowels. We make it a rule to examine the faeces of all patients admitted for typhoid, and if evidence of infection is discovered within the first week santonin and small doses of calomel are given. Later, we seize the moment when there is spontaneous looseness to give smaller and repeated doses of santonin without the addition of an aperient. It must be admitted that this form of treatment, though it appears harmless, is not always successful.

Kala-azar.—Finally, in a country where kala-azar is prevalent, the association of this disease with typhoid should be remembered (Rogers, 1910, and Napier, 1927) and the possibility of its supervention should be considered when there is an apparent relapse or when the period of fever is unduly prolonged.

REFERENCES

- Napier, L. Everard (1927) *Kala-azar*. Oxford University Press, Calcutta.
 Rogers, Leonard (1910). *Fevers in the Tropics*. Oxford University Press, London.

THE ETIOLOGY AND TREATMENT OF RETINAL DETACHMENT

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WITHIN the last five years detachment of the retina in all its aspects has interested the whole ophthalmic world and the importance of the subject led to its being chosen as one of the two main subjects for discussion at the recent International Congress of Ophthalmology at Madrid, at which I had the privilege of being present.

Etiology

Prevailing opinion still appears to be with Gonin who has taught that a hole or tear in the retina is the cause of detachment and that to cure this detachment it is all-important to localize the hole and occlude it by some means or other. If the operation is not successful in closing the hole or tear, the detachment recurs. His theory is however disputed by many, notwithstanding the fact that the principles underlying his method of cure have been generally admitted.

Shapland classifies holes and tears into five groups as follows:—

1. Round, oval, fenestrated, punched-out holes.
2. Arrow-head, and horse-shoe-shaped rents.
3. Disinsertions at the ora serrata.
4. Radial slit-like tears.
5. Irregular rents.

At Moorfield's Hospital, London, round and oval holes have been found to be the most common, with disinsertions at the ora serrata coming a good second, and arrow-head and horse-shoe shaped rents a close-up third. Slit-like tears and irregular rents are much less common.

Arruga (Barcelona) with a large experience of retinal detachments found the horse-shoe shaped hole to be the commonest.

The hole or tear may be single or multiple; in about 40 per cent of cases, round and oval holes are multiple and may be fenestrated. They vary in diameter from less than 0.1 mm. to 1.5 mm. The commonest position for these holes is in either of the temporal quadrants of the retina; they can occur in the nasal quadrants also, but far less commonly. They are situated from 1 mm. to 9 mm. with an average of 3 mm. distance from the ora serrata. Disinsertions at the ora serrata are more often single but can be multiple and occasionally occur in both eyes. They are usually situated on the temporal side of the retina and more commonly in the inferior temporal quadrant; they are very rarely found in the nasal quadrants. The arrow-head and horse-shoe-shaped rents are usually large and nearly always single, although they can be combined with other varieties of holes. They are situated usually above the

horizontal axis of the globe and are more often found in the temporal half than the nasal half of the retina. Round and oval holes are more commonly found in myopes and in high myopes more than in low; the same applies to the arrow-head and horse-shoe-shaped rents. Disinsertions at the ora serrata are more frequently to be found in emmetropes, less commonly in low myopes, and still less commonly in high myopes. How actually these holes or tears are caused is still a matter of conjecture. The round, oval, arrow-head, and horse-shoe shaped holes are produced according to Gonin by the traction of the degenerate vitreous stroma pulling on a small area of retina which has been involved in a previous inflammation. The small punched-out circular hole is most probably caused by a local patch of choroido-retinitis and the fenestrated holes are produced by localized retinal degeneration. The irregular-shaped tear and the disinsertion are not caused by diseases of the vitreous, but are definitely due to the results of direct or indirect trauma. The incidence of retinal detachment increases with age and about two-thirds of the cases occur in males. Fifty to sixty per cent of cases are found in myopes and about seventeen per cent are bilateral. Retinal atrophy and thinning are the most important predisposing causes and these are most probably due to a low-grade choroidal inflammation or tuberculosis.

Sourdille's theory of retinal detachment is that the situation of the pathological process is in the choroid coat of the eye, especially in the chorio-capillaris layer. This focus of infection causes a serous choroiditis with a collection of fluid between the two layers of the retina. Sourdille is of the opinion that a detachment is not necessarily always associated with a hole, and all that is necessary to cure the detachment is to let out the sub-retinal fluid and bring about an adhesive union between the retina and the choroid.

Schieck, Wessely and others consider that the tear or hole has not yet been proved to be the cause, but is a symptom of retinal detachment. Undoubtedly there are many cases of detachment in which a tear is not present and also there are holes in the retina without any detachment.

Dauids observed a case in which a hole was first seen and was followed later on by a detachment which grew in size. He considered that the retina was not detached by the entrance of vitreous alone through the hole but that the latter acted as an irritant and set up an inflammation in the choroid with the formation of an exudation, which gradually increased and detached the retina.

Jcandelize has brought forward a mixed theory of causation of retinal detachment. First a localized patch of inflammation occurs in the vascular choroid, leading to an exudation of serum between the pigmented and the

non-pigmented layers of the retina; later this is followed by a hole in the retina.

Arruga analysed the sub-retinal fluid in 38 cases. At first it showed a low albumen content and a low density, but later leucocytes, pigment cells, and an increase of the albumen were found. In old cases the density was again low; this was due perhaps to choroidal atrophy.

Lohcek experimenting on animals produced a retinal detachment by drawing up vitreous with a large needle and syringe, and maintaining suction as the needle was slowly withdrawn. He found that in the cases in which there was no tear the detachment healed spontaneously, in those in which there was an accompanying tear the detachment did not heal of its own accord as a rule, and that, in the few cases that reapposition did occur the tear healed, the margins of the tear becoming adherent to the choroid.

Blatt classifies retinal detachments into:—

1. The exudative type due to pregnancy, eclampsia, nephritis, tuberculosis, syphilis, diseases of the orbit and nasal sinuses. These should be treated along medical lines.

2. The idiopathic type associated with senility and myopia.

3. The traumatic type due to direct or indirect violence.

The last two types as a rule do not yield to conservative treatment and surgical interference by Gonin's method of ignipuncture or one of the other methods must be adopted.

Treatment

The first stage in the evolution of the surgical treatment of retinal detachment was largely due to the pioneer work of Professor Gonin. His operation consists in closing the tear or hole in the retina by cautery puncture after preliminary accurate localization of the hole. In Gonin's hands a cure has resulted in 55 per cent of cases, provided the operation is carried out within three weeks of the onset. In 15 per cent of cases a second ignipuncture was necessary and the results were good. In detachments of under one year's duration 40 per cent were satisfactory.

According to Gonin the following types of cases are unsuitable for his operation and these comprise a large number:—

1. Tears that are large and are situated too far from the ora serrata and close to the posterior pole of the globe.

2. Multiple tears.

3. Eyes which have semi-opaque or opaque media.

4. Patients who for some reason or other are unable to be kept quiet after operation.

Besides, the Gonin operation has many serious disadvantages, amongst which the most important are:—

1. Choroidal and subchoroidal hæmorrhages, also hæmorrhages into the vitreous.

2. Injury to the vitreous and the formation of traction bands.

3. Necrosis of the retina and the formation of scars.

4. Atrophy of the eye-ball.

Lindner agrees with Gonin that a detachment is accompanied by a tear in the retina and that the greatest proof of this supposition is that the detachment disappears as soon as the tear is occluded. Out of 118 cases, he found a tear in 84, and operating by Gonin's technique he got successful results in 38 per cent of cases.

Ophthalmologists of equal skill, presumably, have been unable to obtain the same high percentage of cures as Gonin. Owing to this and the difficulty, as well as the uncertainty in localizing the tear and to the fact that often a tear cannot be found, ophthalmologists have been led to adopt other surgical procedures to obtain more successful results.

The second stage in the evolution of the surgical treatment of retinal detachment was largely due to the work of Guist and Lindner. They used a method devised by the former, and now known as the Guist operation. The purpose of this method is to set up a localized inflammation in the choroid by chemical means, resulting in the adhesion of the detached part of the retina to the underlying inflamed choroid and closure of the retinal tear. The inflammation in the choroid should be limited to the whole area of detached retina.

The Guist operation is performed under the usual local anæsthesia and consists in making a series of holes in the sclera over the exact area of the tear with a 1.5 mm. Elliot trephine. If necessary, a muscle may be temporarily divided to expose the part of the sclera required. These trephine holes should be placed not more than 1.5 mm. apart and should not go completely through the last thin layer of the sclera for fear of injuring the choroid. This layer is removed later with the point of a fine Graefe knife or keratome. The trephine holes should completely surround the tear and a series should also be made in the line between the detached and non-detached retina. As many as 24 trephine holes can be made. The choroid exposed through these holes is then cauterized with a fine pencil of potassium hydrate for a second, and immediately afterwards the area is neutralized with a half per cent solution of acetic acid and then irrigated with normal saline. After the cauterization has been completed, the sub-retinal fluid is allowed to escape by perforating the choroid through a number of the trephine holes with a lacrimal probe, so that the retina and choroid can come together and become adherent. The after-treatment is most important and is much the same as the post-operative treatment following the Gonin operation. Complete rest in the recumbent position for 7 days, and, as far as possible, the maintenance of the patient's head in such a position

that the vitreous rests on that part of the retina with the tear. Both eyes are kept bandaged for about a week, and later, stenopœic glasses are worn for a month or 6 weeks.

At the annual meeting of the German Ophthalmological Society in 1932 at Leipzig, Guist reported 77 per cent of his uncomplicated cases, 61 in number, as cured. In eleven complicated cases such as those accompanied by retinitis proliferans, irido-cyclitis, etc., he reported two successful cures. In seven patients with a detachment of four months' duration and who had previously been treated unsuccessfully by Gonin's operation, four gave successful results. In 17 patients with a retinal detachment of eight months' duration and who had also been previously treated by canthary puncture, two were successful. In 13 aphakic eyes with retinal detachment, five gave successful results. Guist's total average of successful results was 56 per cent.

Lindner in 1931 reported a series of 19 patients in whom he got 68 per cent of successful results.

The advantages of the Guist operation are :—

1. Exact localization of the hole or tear is not required.
2. Complications are not so frequent and severe.
3. There is no scarring of the retina and damage to the vitreous.
4. It is sometimes successful in cases in which ignipuncture has failed.
5. In old-standing cases and in cases in which tears are not found, it is sometimes successful.
6. In multiple tears, large tears, marked hypertension, it is more often successful than Gonin's method.

The disadvantages of the operation are :—

1. The time taken to carry out the operation which may be anything from one to two hours.
2. The danger of penetrating the choroid with the trephine and the loss of the sub-retinal fluid rendering continuance of the operation impossible owing to hypotony.
3. The danger of bleeding with the occurrence of intra-ocular hæmorrhage; this can largely be prevented by taking care to avoid the venæ vorticosæ.

The third stage in the evolution of the surgical treatment of retinal detachment was largely due to the work of Larsson, Weve and later Safar. They employed diathermy to close the tear in the retina and considered it was a simpler and less dangerous procedure than other methods. The purpose of their method is, like the Guist operation, to set up an adhesive choroiditis, but by diathermal applications rather than by chemical irritation. As a result, the detached portion of the retina becomes adherent to the underlying area of inflamed choroid and the retinal tear becomes occluded.

They like Gonin, Lindner and Guist are also of the opinion that the tear must be closed if the operation is to be a success.

The methods of electro-diathermy as used by Larsson, Weve, and Safar differ in their technique. Larsson uses multiple superficial diathermy. The active electrode is applied to the surface of the sclera and consists of a fine metal rod of 1 to 2 mm. thickness. The current should not exceed 150 milliamperes and should be controlled by a foot switch. As soon as the area of sclera under treatment shows a greenish-grey discoloration, the current should be turned off and the electrode removed. This usually takes from 3 to 5 seconds. A series of these electro-coagulation areas are made on the sclera at a distance of 3 millimetres from each other and the hole encircled, or if the tear is at the ora serrata a semi-circular line of applications is made over the affected area parallel to the limbus. The sub-retinal fluid should be carefully dealt with in the same way as in the Guist operation. Larsson has reported 40 cases treated by this method in which 20 cases gave excellent results. He considers that cure is brought about by tissue reaction and that, on account of the adhesions between the detached part of the retina and the underlying choroid over a large area, recurrences of detachment are less common. Intra-ocular hæmorrhages are uncommon owing to the coagulation of the blood-vessels and there is no trauma to the vitreous. In this method, like that of Guist, exact localization of the tear though advantageous is not essential.

Larsson's method of superficial diathermy is now popular in England and at Moorfield's Ophthalmic Hospital, London, it is the routine method of surgical procedure for retinal detachment; the results are more satisfactory than those following the Gonin ignipuncture operation. The high-powered diathermy apparatus, permitting very rapid sparking with low current intensity, which is necessary for electro-coagulation, is made by John Weiss & Son, London, and is now being used in the Eye Infirmary Medical College, Calcutta, and in the Government Ophthalmic Hospital, Madras.

Weve combines surface diathermy with multiple diathermal electro-punctures, or uses one or other method separately. The electro-puncture procedure consists of penetrating the sclera and choroid with the active electrode which has a sharp pointed terminal. Weve emphasizes the importance of preliminary exact localization of the hole or tear. The current should not exceed 50 milliamperes and the time of application varies from one to five seconds according to circumstances. He uses superficial diathermy for cases in which there is a tear at the ora serrata and for flat detachments and the electro-puncture procedure for cases in which there is much ballooning of the retina and old-standing cases of retina detachment. Weve reported 23

cases treated by diathermy coagulation, of which 11 showed satisfactory results.

More recently, Weve, using a uni-polar electrode and a current of only a few milliamperes, has been localizing the hole in relation to a micro-puncture by immediate ophthalmoscopy.

Safar has been working on much the same lines as Weve and has introduced a variety of different electrodes with one or many needle points, 2 mm. long. He also uses his minute 'nails' which he implants in the selected area of the sclero-choroid by holding them in an insulated forceps and pressing them against the sclera with the terminal of the active electrode. A series of these 'nails' are arranged in a circle around the hole, or in the form of a semi-circle if the tear is at the ora. The 'nails' should be about 3 mm. apart and should be left in position until the requisite number of punctures has been made. In cases in which a tear or hole cannot be found a retinal detachment can often be cured by applying diathermy punctures in that part of the retina in which the detachment commenced. The 'nails' are removed together and the sub-retinal fluid allowed to drain away. It is important to see that this fluid has escaped so that apposition of the retina and choroid takes place, resulting in adhesion of these two layers and closure of the hole. To cure a retinal detachment Safar like many others considers it is necessary to produce an inflammation in the choroid in the region of the retinal tear but the injury to the retina and choroid should be as little as possible. This is best accomplished by diathermy puncture, as it produces minute scars such as are seen in mild choroiditis.

Up to 1932 Safar has reported 39 unselected cases treated by diathermal micro-puncture and has had 24 successful results.

At present it would appear that electro-coagulation by diathermy will be the method of choice in the future for the treatment of retinal detachment for the reason that its application can be modified and its dosage graduated. Whatever line of treatment is adopted it should always be remembered that the three important factors are—irritation to produce an adhesive choroiditis, evacuation of the sub-retinal fluid, and rapid reattachment of the retina to the choroid.

Careful preliminary examination of each case, localization of the hole or tear, and strict attention to detail at the time of operation and the after treatment are necessary if the best results are to be obtained. At the same time I would like to emphasize the fact that however carefully the measurements to localize the hole are made they are bound to be inaccurate; and also it is possible to be either too conservative in treatment or actually to do too much. Both result in partial improvement or no improvement, the

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PRIMARY CARCINOMA OF THE GALL-BLADDER

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A. S., a Sikh, aged 48 years, was admitted to the Mayo Hospital, Lahore, on the 20th of July 1932, suffering from ascites, oedema of the lower extremities and jaundice. He complained of pain in the right hypochondrium which was also tender to palpation. The duration of the disease was stated to be six months, during which time the patient had gradually but progressively grown worse. The total white blood cell count was 13,000 per c.mm. of which 85 per cent were polymorphonuclear leucocytes. Blood films showed no parasites. Fever and cholæmic symptoms were present and the latter increased rapidly. The patient died on the 24th of July—4 days after admission to hospital. Throughout his stay in hospital he suffered from retention of urine which had to be relieved by catheter.

The clinical diagnosis was malignant disease of the liver.

At autopsy I found a tall emaciated Sikh, intensely icteric, presenting the appearance of 'black jaundice'. The abdomen was greatly distended with fluid and the lower extremities and scrotum tense with oedema. No enlargement of supra-clavicular lymphatic glands was found.

No naked-eye abnormality was detected in the lungs or tracheo-bronchial and mediastinal glands. The heart presented no abnormality except for two 'milk spots' on its anterior surface.

The peritoneal cavity contained 8 pints of intensely bile-stained fluid. The peritoneum, both visceral and parietal, was found to be free from localized or diffuse thickening.

The liver was not enlarged; it was soft, almost diffuent, and of deep-green colour. Its surface was slightly wrinkled; but no surface abnormality indicative either of cirrhosis or a new growth was seen.

The gall-bladder was felt to be hard; this was due to marked thickening of its wall. It was difficult to separate it properly, its neck, the cystic and common bile ducts and the head of the pancreas being all parts of a hard mass, so the stomach was ligatured off and separated at the pyloric end, and the duodenum similarly separated off the jejunum at its distal end.

(Continued from previous column)

former from the production of irritation insufficient to cause an adhesive choroiditis, the latter from too much inflammatory exudate poured out between the retina and the choroid.

The liver, the gall-bladder, the pancreas and the duodenum were then removed together.

The cut surface of the liver was deep green to greenish brown in colour and showed no cirrhotic or neoplastic change. The gall-bladder was somewhat adherent to the fossa where it is lodged on the liver, but there was no grossly observable neoplastic change in the contiguous hepatic substance.

The gall-bladder was then opened. It contained only a small amount of thick viscid greenish bile. No gall-stones were found. Its fundus was found to be the seat of an infiltrative growth which projected noticeably into the

Section of the liver showed dilated bile ducts and a relative increase of pericholangitic connective tissue. Small areas of necrosis of liver parenchyma were also in evidence.

Sections were taken from different parts of the new growth in the gall-bladder, and from the mass involving the head of the pancreas and the cystic and sub-pyloric glands. Sections from the growth in the fundus show it to be a squamous-celled carcinoma, exhibiting typical flat squamous cells (figure 2) and sections from the mass involving the head of the pancreas show a typical scirrhus carcinoma with considerable fibrosis and islands of spheroidal cells.



Fig. 1.—A. Portion of liver. Green and wrinkled. B. Thickened gall-bladder showing growth in the fundus. C. Duodenal mucosa covering the tumour mass involving the head of the pancreas. D. Portion of tumour mass.



Fig. 2.—Photomicrograph from a section taken from the growth in the fundus, showing squamous cell metaplasia.

viscus on a sessile base (figure 1). It showed no strict delimitation but faded away into the much-thickened wall of the viscus. The growth diminished in hardness as you approached towards the neck, where it was soft and friable, and extended into and almost obliterated the cystic duct. The common bile duct could not be dissected out. It was imbedded in a hard mass into which were fused the lymph glands of the porta hepatis and also the head of the pancreas. The duodenum was firmly adherent to the mass, but its lumen was free from any nodule or ulceration indicative of mucosal involvement.

There was no evidence of malignant disease of the peritoneum and no marked enlargement of mesenteric lymph glands. The ascites was evidently due to pressure of the growth on the portal vein and not to malignant peritonitis. The stomach and the intestines showed no abnormality and the examination of the spleen, genito-urinary and nervous systems also gave negative result. Careful naked-eye examination of different viscera failed to show any secondary deposits.

Histological examination showed nothing of pathological interest, except in the liver and the parts involved in the new growth.

A large hyperchromatic cell is seen near the centre (figure 3).



Fig. 3.—Photomicrograph showing masses of spheroidal cells enclosed by mature fibrous tissue.

Evidently this new growth had its origin in the fundus of the gall-bladder and extended therefrom to the common bile duct and the head of the pancreas. Although the pancreas is more commonly the seat of primary carcinoma and secondary growths in it are rare, primary carcinoma of the head of the pancreas leads, according to Courvoisier's law, to a much dilated and

thin-walled gall-bladder, which was not a feature of this case. Metastases very commonly occur from a pancreatic carcinoma in the liver and the peritoneum; there were no metastases in this case. I have also been unable to find mention of any case in the available literature where a primary carcinoma of the head of the pancreas had extended to the gall-bladder and showed squamous metaplasia in that situation.

On the other hand squamous metaplasia in primary carcinoma of the gall-bladder, though not of common occurrence, is met with not infrequently and the same may be said of secondary involvement of the pancreas in primary carcinoma of the gall-bladder. In the gall-bladder too, like the pancreas, it is primary carcinoma which is the commonest growth and the fundus its commonest site. Ewing (1928), quoting Musser, gives an analysis of one hundred cases of primary carcinoma of the gall-bladder in which the liver was found involved in 54, abdominal lymphatic glands in 16, lungs or pleura in 10 and pancreas and adrenals occasionally.

Besides these two uncommon features, squamous metaplasia and involvement of the pancreas, the case under discussion also showed no metastases in the liver and no gall-stones. This last feature deserves special consideration. The association of gall-stones with cancer of the gall-bladder is considered to be very intimate. It is regarded as an important illustration of the rôle of chronic irritation in the production of cancer. Graham (1931) says cancer of the gall-bladder is not a rare disease but forms 8 to 10 per cent of all carcinomata and, on the basis of the gall-stones gall-bladder-cancer relationship, recommends early removal of the viscous in all cases of cholelithiasis. Leitch (1924) states that over 10 per cent of adults have gall-stones and that 5 per cent of these develop cancer of gall-bladder. He asserts that gall-stones are present in practically all cases of cancer of the gall-bladder. Ewing (1928) quotes Musser as saying that gall-stones are found in 69 per cent of cases who have cancer of gall-bladder, and Janowski puts it at 100 per cent. Watts (1922) in the study of a series of 525 operations on the gall-bladder found primary carcinoma in 20, i.e., 3.8 per cent, and of these 20 cases gall-stones were found only in 10.

Osler and McCrae (1926-28) state that in the Massachusetts General Hospital, Boston, U.S.A., of 2,631 operations performed on the gall-bladder during 30 years, 63, i.e., 2.4 per cent, showed primary carcinoma of the gall-bladder and in these latter only 36 per cent showed gall-stones.

In the Mayo Hospital, Lahore, of a series of 129 operations done on the gall-bladder, 92 showed gall-stones and 11 were found to have carcinoma, but in the latter number presence of gall-stones was recorded only in 2. Of these

(Continued at foot of next column)

NEPHROLITHIASIS OF THE HORSE-SHOE KIDNEY

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By the term horse-shoe kidney is meant the fusion of the kidneys across the vertebral column. The band of union, or the isthmus, passes commonly between the lower and rarely between the upper poles across the abdominal aorta and the inferior vena cava. The isthmus varies from a band of fibrous tissue to a definite bridge of renal parenchyma. According to statistics compiled from the post-mortem room, the incidence of the horse-shoe kidney varies from 1 in 1,590 to 1 in 500 cases (0.06 per cent

(Continued from previous column)

11 cases 7 showed metastases in the liver and one showed extension to the stomach. In addition there was one case of malignant disease of the common bile duct.

Seven out of the above 12 cases of cancer were females and 5 were males. The average age incidence was 39.7 years, the limits being 30 and 55 years.

Of the 92 cases of cholelithiasis 29 were Europeans and 63 were Indians. The average age of patients in the former group was 40 years and in the latter 32.6 years. In the former group there were 22 females to 7 males, and in the latter 48 to 15.

In the Indian group, 41 cases were amongst Hindus—30 females and 11 males, 19 amongst Mohammedans—16 females and 4 males, and two amongst females of other communities. In spite of their lower numerical strength in the population the higher incidence of cholelithiasis amongst Hindus may be related to their fat-rich dietary.

It has been suggested that in cases of carcinoma of gall-bladder where no gall-stones are found the stones may have passed out, or that metabolic and infective factors causing mural irritation in that viscus may even in the absence of gall-stones lead to cancer. Squamous metaplasia probably indicates a more persistent operation of the irritant than that which obtains in forms of carcinomata representing cellular structure more closely allied to the lining epithelium of the viscous.

REFERENCES

- Ewing, J. (1928). *Neoplastic Diseases*. Philadelphia: W. B. Saunders.
Graham, E. A. (1931). Prevention of Carcinoma of Gall-bladder. *Ann. Surg.*, Vol. XCIII, p. 317.
Leitch, A. (1924). Gall-stones and Cancer of the Gall-bladder. *Brit. Med. Journ.*, Vol. II, p. 451.
Osler, W., and McCrae, T. (1926-28). *A System of Medicine*. London: Henry Kimpton.
Watts, S. H. (1922). Primary Carcinoma of Gall-bladder. *Virginia Med. Monthly*, Vol. XLIX, p. 175.

to 0.2 per cent). In cases of renal calculus alone, there were 12 cases of horse-shoe kidney out of a total of 981, or 1.3 per cent (July, 1929). As would be expected, surgical statistics show a much higher ratio, because pathological changes are more likely to occur in the abnormal kidney. The following statistics have been compiled from the post-mortem examination records of the pathological department of the Calcutta Medical College and hospitals.

Total number of post-mortem examinations—1,513 (1916–32).

On examination.—No definite signs could be elicited. Micturition was painless; frequency, 6:2; character of stream, good.

Tongue, moist and coated. Of average build, poorly nourished. Temperature—normal, Pulse and respiration—80 and 22 per minute respectively.

Examination of urine

Specific gravity, 1016.

Reaction, slightly alkaline.

Albumen, faint trace.

Microscopic examination, triple phosphates.

ABNORMALITY

Kidney	Lobulation	Solitary	Horse-shoe	Fusion anomaly	Ectopic
Right ..	6	3	2	1 (2 ureters opening into bladder)	1
Left ..	8 (Both kidneys 6 times)				

There were, thus, two cases of horse-shoe kidney in a series of 1,513 (or 0.13 per cent). It is to be noted that in this series there was not a single instance of nephrolithiasis in an abnormal kidney.

An analysis of the registrar's records of the Calcutta Medical College hospitals during the period 1930–32 shows that the total number of nephrectomies and pyelo- or nephrolithotomies was 33. This number did not include any case of horse-shoe kidney. In comparison with European and American statistics, the infrequency of nephrolithiasis of the normal, as well as of the abnormal, kidney in Calcutta is worthy of note. On account of the rarity of nephrolithiasis of the horse-shoe kidney and the presence of other interesting anomalies, the following case appears to be worthy of record.

Present case

J. N. C., male, aged 47, was admitted into the Prince of Wales hospital on 26th June, 1933, on account of recurrent attacks of pain in the left loin and back, shooting down into the scrotum and the upper part of the thigh.

History of the present illness.—The first attack of pain occurred in 1929, but there was pain on both sides. The patient gives a history of sudden obstruction of urine later in the year. During the year 1930, there were two attacks of painful hæmaturia at an interval of about six months. In 1931, some white deposit was noticed in his urine for the first time. The pain on the right side disappeared suddenly, but it became agonizing on the left side.

History of past illness.—No history of syphilis or gonorrhœa.

Family history.—There was no history of calculous disease in the parents or near relatives.

Examination of blood

Hæmoglobin, 80 per cent.

Leucocytes, 6,600 per c.mm.

Polymorphonuclears, 52.

Lymphocytes, 40.

Large mononuclears, 0.

Eosinophiles, 8.



Fig. 1.—Skiagram showing the presence of a calculus in the pelvis of the left kidney.

Urea concentration test

No. I specimen, 1.6 per cent.

No. II specimen, 2.4 per cent.

No. III specimen, 2.8 per cent.

No. IV specimen, 3 per cent.

Blood urea.—0.03 per cent.

Chromocystoscopy (indigo carmine).—Excretion of the dye only by the left ureter. No excretion by the right ureter within 15 minutes.

Skiagraphy of the urinary tract.—A solitary stone was seen in the pelvis of the left kidney.

Excretion urography (Uroselectan B).—It is seen from the skiagrams that the lower poles of both the kidneys are pointing inwards. This appearance is present in the horse-shoe kidney.



Fig 2—Excretion urography (5 mins) The outline of the calculus is overlapped by the nephrogram on the left side.

The left ureter is lying on the outer side of the kidney. The right ureter is not seen. A calculus is seen within the pelvis of the left kidney, which appears to be excreting more than the right.

Diagnosis.—Nephrolithiasis of a horse-shoe kidney with imperfect function of the right side.

Treatment

(a) *General.*—Careful general treatment was undertaken in view of the imperfect function of the right half of his kidney and an attack of influenza during his stay in the hospital.

(b) *Operative.*—An extraperitoneal lumbar incision was made. The diagnosis of horse-shoe kidney was confirmed by tracing the isthmus from the lower pole across the vertebral column in front of the aorta and the inferior vena cava. The ureter was next identified. It was abnormal in position. It was found to come out from the posterior surface, and a little lower down it was crossed by an aberrant artery. Pyelolithotomy was performed and the calculus was extracted intact. The incision was left open and a drainage tube was inserted. The wound was next closed in the usual way.

Convalescence was uneventful with the exception of a mild attack of broncho-pneumonia. The patient was discharged cured on 2nd October, 1933.

Commentary

With regard to the differential diagnosis, the following conditions had to be considered—(a) Bilateral nephrolithiasis, with obstruction of the right ureter. (b) Calculus in a solitary kidney. (c) Other abnormal conditions. On skiagraphy of the urinary tract, the first of these conditions was excluded. The correct diagnosis was made with the help of excretion urography. The correct assessment of renal function however is beset with many difficulties. In my experience chromocystoscopy is found to be a much more reliable method than the urea concentration test. The excretion of uroselectan B is a reliable index of the physiology of renal secretion. Before the days of excretion urography, a pre-operative diagnosis of horse-shoe kidney was comparatively infrequently made. There is no syndrome of symptoms and signs, characteristic of the horse-shoe kidney. Consequently, great difficulties are occasionally met with in diagnosis, in spite of the recent methods of investigation. In this connection, it is of interest to consider a case recorded by Dunhill (1932) of which the writer had personal knowledge in St. Bartholomew's Hospital, London:

A young man, aged 24, was admitted with the history of a sudden attack of pain beginning in the



Fig 3—Excretion urography (15 mins) The outline of the horse-shoe kidney is well shown.

hypogastrium and radiating to the right lumbar region. Skiagraphy did not reveal anything abnormal. An appendicular abscess was suspected. An operation was performed outside but the appendix was found to be normal, and a small swelling was palpated. On excretion urography, the left renal pelvis was outlined but

no shadow was seen on the right side. The diagnosis of a right-sided hydronephrosis was made. Nephrectomy was performed and it was then realized that a horse-shoe kidney was present. The presence of purulent infection inhibits visualization by excretion urography.

In course of my post-graduate work under Prof. von Lichtenberg of Berlin, I had the good fortune to study a remarkable series of excretion urograms. The visualization of the isthmus of the horse-shoe kidney was a striking feature. This is due to the nephrogenic possibilities of excretion urography (von Lichtenberg and Swick, 1929). By means of an excretion urogram this anomaly is more easily diagnosed. The important diagnostic features are given below (von Lichtenberg, 1931):

(a) The bending of the lower kidney pole towards the vertebral column.

(b) The pelvis and calyces are of a bizarre shape.

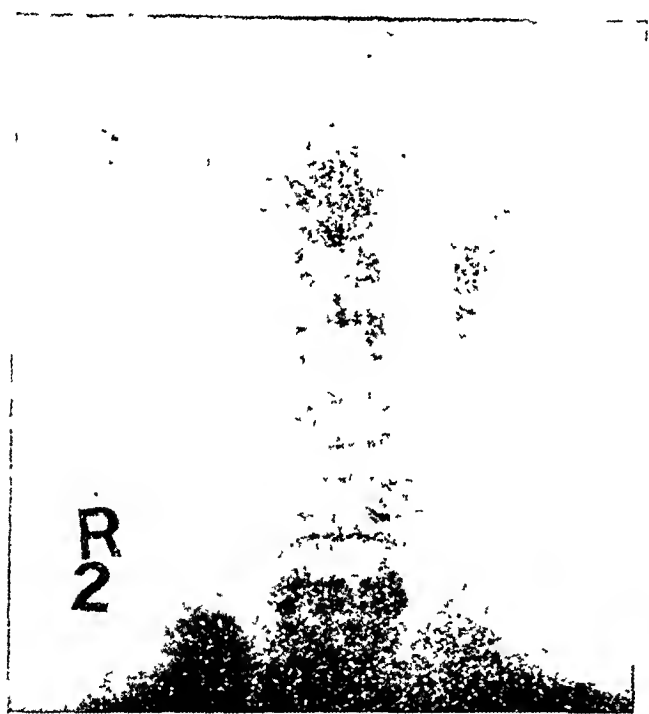


Fig. 4.—Excretion urography (30 mins.). The left ureter is visualized. The left half of the kidney appears to function better than the right.

(c) The 180 degree turning of the one or the other side, and the unusual course of the ureter.

With regard to treatment, there is little doubt that an aseptic calculus lying in one side of a horse-shoe kidney is best removed as soon as possible. Treatment is much more difficult, when infection is present. It is believed that infection spreads more rapidly from one organ to the other in the case of horse-shoe kidney than when the two kidneys are separated. In the latter case, infection is always carried by the blood stream from one kidney to the other, but in the former it may spread across through the isthmus. Bilateral calculus means infection first on one side and then on the other (Ball and Evans, 1932). If infected calculi are found

on both sides, they may be removed through the pelvis, if they are small. If large branching calculi are present in both halves, or if numerous stones are scattered throughout the fused kidney, it is usually impossible to remove the calculi. In case of pyonephrosis, drainage is indicated.

The difficulties and complications of the operation are dependent to a large extent on the accessibility and vary indirectly with the degree of fusion. The pelvis is generally markedly irregular in size and shape. It is flattened out over an extensive area on the anterior surface of the kidney. The ureter usually passes in front of the isthmus, but occasionally also behind it (Judd, Braasch and Scholl, 1922). The presence of anomalous blood vessels greatly increases the risk and difficulty of surgical procedures. The arterial branches enter the parenchyma mostly behind the pelvis (Jeck, 1932). The arteries come from the aorta either in one common trunk arising below the mesenteric arteries with several smaller branches from the iliac arteries, or else two separate trunks, similar to the normal renal arteries, only at a lower level. Besides these, however, there are nearly always smaller twigs coming from below and behind, arising from the external and internal iliac vessels.

The special features of the case reported in this paper are as follows: (i) on chromocystoscopy there was no excretion of the dye by the right ureter within 15 minutes; (ii) the diagnosis of a horse-shoe kidney was made with the help of excretion urography, the left ureter being found to lie on the outer side of the kidney, and the left kidney appearing to excrete more than the right; (iii) at the time of operation it was noted that the ureter was lying posterior to the isthmus, where it was crossed by an abnormal artery. Similar anomalies of the pelvis and ureter are also rarely met with in the case of ectopic kidneys. Such a kidney has recently been described (De, 1933), in which the pelvis is situated laterally and anteriorly.

The stone was removed by pyelolithotomy and the patient made a complete recovery. From the history of recurrent attacks of pain on both sides and subsequent cessation of pain on the right side, it may be inferred that stones were present at first on both sides. It is not clear why there was imperfect function on the left side. It would be interesting to investigate the subsequent function of the left kidney. The patient has been advised to attend the hospital for a cystoscopic examination at the end of six weeks. If necessary ureteric catheterization and ascending pyelography may be performed. With regard to prognosis, recurrence of nephrolithiasis is not unusual. It is a remarkable fact that kidneys which show a developmental defect are much more prone to stone and other diseases than the normally

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POST-PUERPERAL POLYNEURITIS

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and

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THOUGH the last word on the ætiology of beri-beri has not yet been said, it is generally accepted by clinicians, experienced in this disease,

(Continued from previous page)

developed organs. The high implantation of the ureter and the sharp uretero-pelvic angle, which prevent free drainage, are the most common causes of disease in these kidneys. Consequently it is explicable why recurrence of stone is usual. The prognosis is worse in the case of infected calculi. From an analysis of the records of the Calcutta Medical College hospitals, the infrequency of nephrolithiasis is very striking. A rare case of calculous hydronephrosis in a horse-shoe kidney in an Indian female was described by Marchant (1931). The diagnosis however was made during operation.

Summary

(1) A case of nephrolithiasis of the horse-shoe kidney with interesting anomalies has been described.

(2) In this connection the surgical records of the Calcutta Medical College hospitals for the last three years and the post-mortem records for the last 18 years have been investigated and are summarized.

(3) A pre-operative knowledge of the existence of a horse-shoe kidney is a great advantage, owing to the dangers and difficulties caused by the various anatomical anomalies.

I wish to express my gratitude to my senior colleague Professor L. M. Banerjee for his kind permission to publish this case. My best thanks are due to Dr. M. N. De, Professor of Pathology, for his kindness in giving me free access to the hospital records, to Dr. G. Galstaun, the honorary radiologist, for the excellent skiagraphy, and to Dr. R. R. Roy, our senior house surgeon, for his valuable help.

REFERENCES

- Ball, W. G., and Evans, G. (1932). *Diseases of the Kidney*. London: J. and A. Churchill.
De, M. N. (1933). *Brit. Journ. Anat.* (In press).
Dunhill, T. P. (1932). *Proc. Roy. Soc. Med.*, Vol. XXV, p. 546.
Jeck, H. S. (1932). *Journ. Amer. Med. Assoc.*, Vol. XCVIII, p. 603.
Joly, S. S. (1929). *Stone and Calculous Disease of the Urinary Organs*. London: William Heinemann (Medical Books), Ltd.
Judd, E. S., Braasch, W. F., and Scholl, A. J. (1922). *Journ. Amer. Med. Assoc.*, Vol. LXXIX, p. 1189.
Lichtenberg, A. von (1931). *Brit. Journ. Urology*, Vol. III, p. 119.
Lichtenberg, A. von, and Swick, M. (1929). *Klin. Woch.*, Vol. VIII, p. 2089.
Marchant, G. H. (1931). *Indian Med. Gaz.*, Vol. LXVI, p. 679.

that the avian polyneuritis induced by avitaminosis is not clinically identical with human beri-beri. Megaw (Megaw and Rogers, 1930), after enumerating at length the debated points with reference to the ætiology, added that he did so in the hope that some readers might seize any opportunity, which came their way, of making contributions to the knowledge of beri-beri. We have had the opportunity of observing, during the past few months, a variety of polyneuritis occurring in women during the puerperium. The neuritic condition that is described below appears to be the only condition, occurring in an endemic area, that bears any resemblance to the well-recognized syndrome of beri-beri. An attempt has been made here to find out (a) if this polyneuritis is a variety of beri-beri endemic in the locality, (b) if so, what are the special ætiological factors that determine it, and (c) if not, what exactly the condition is.

Other records of puerperal polyneuritis.—Peripheral neuritis as a complication of the puerperium or of pregnancy has been noticed by some, though it is not a recognized complication or sequel of pregnancy or the puerperium, such as are eclampsia, toxæmic kidney, anæmia and hyperemesis. Wilson and Garvey (1932), while drawing attention to three other presumable toxæmias of pregnancy, i.e., psychosis, impetigo gestationis and certain types of multiple polyneuritis, described three cases of polyneuritis gravidarum in the later weeks of pregnancy. They hold the view that ordinarily the symptoms subside with the puerperium in cases where they start during the later months of pregnancy. Having had only three cases, they observe that, while the condition of polyneuritis has been recognized as a complication of pregnancy and the puerperium for a long time, it occurs not very frequently in the severe forms, and no one person has had the opportunity of observing a large series of cases.

Churchill (1854) discussed the possibility of this condition being of a toxic nature, after collecting 33 examples. Most of his cases showed albuminuria, which lent support to the idea that it was a toxæmia of pregnancy.

Mopuss (1887) reported seven cases of peripheral neuritis all occurring in the puerperium and with no associated general disturbance.

Lindeman (quoted by Wilson and Garvey, 1932), in fatal cases of this type, found at autopsy, in addition to lesions of various peripheral nerves, fatty degeneration of the liver and cloudy swelling and degenerative changes in the kidneys. Similar lesions were found in the liver and kidneys of the fœtus.

Von Hosslin (1905) collected 94 cases, from the literature and his own experience. His series included all types, in some only a single nerve being involved, in others groups of nerves, while still others were of the severe type with progressive general paralysis, vomiting and

mental disturbances. In cases with generalized paralysis the mortality was 20 per cent. Von Hosslin did not advocate termination of pregnancy as a necessary means of alleviating the condition. In not a few patients the first symptom appeared in the puerperium, several days after the pregnancy had come to an end.

Among the more recent series is that reported by Albeck (quoted by Wilson and Garvey, 1932) who presented 9 cases of the severe type, with vomiting, psychosis and progressive paralysis. In 7 of them pregnancy was interrupted; all apparently recovered though the convalescence was prolonged and months elapsed before normal muscular function was restored.

Seitz (1892), having excluded all other possible causes, regards the disease as of toxic origin. Only in cases of suspected optic or phrenic nerve paralysis was interruption of pregnancy called for. He cites a case of A. Mayer's treated successfully during pregnancy by the injection of 10 c.cm. of serum from a healthy pregnant woman.

Wilson and Garvey (*loc. cit.*) attempted to study the changes which occur in the general metabolism of such patients. Their cases, that are the most recent to come to our knowledge, are of the following nature. Extensive polyneuritis was associated with pregnancy in its later stages. At the onset of the illness severe and persistent vomiting was noticed with profound mental disturbances. They were satisfied that such toxic agents as alcohol, lead, and infection had no ætiological bearing in these cases. They further said that it was impossible to make any definite statement in regard to the exact ætiology, and for the present the condition must remain in the category of unsolved problems, in common with other toxæmias of pregnancy. They noticed in these cases a peculiar disturbance of the general metabolism characterized particularly by a high carbon dioxide combining power and low blood chlorides. The findings were suggestive of alkalosis. None of these women had any alkaline medication during their illness. None showed any appreciable respiratory disturbances. All had persistent vomiting prior to admission. In the presence of defective elimination alkali might still be retained, and the CO_2 combining power then would remain high. The authors go so far as to offer the suggestion that vomiting was not alone the cause of alkalosis.

Recently other workers in this part of India have observed this condition though they have only made a passing reference to it. Kamath (1931), whose observations are from this very area, when discussing the diverse conditions associated with polyneuritis said that the puerperal period is often complicated by this condition. 'It may also be noted', he said, 'that the puerperium may predispose to beri-beri. In the Circars, beri-beri by a transferred epithet is called "Suthika", which literally means the

puerperal period'. Raman and Mahadevan (1930) while studying beri-beri in the neighbouring district of Guntur recorded that the incidence amongst males was higher at all ages except between 15 and 20. In most cases in women the ailment is subsequent to the first childbirth. They give the clinical picture of fever of a few days duration, weakness of the lower extremities, œdema of the calf muscles, and tenderness and anæsthesia of the legs with loss of knee jerks. They recorded five cases of post-puerperal neuritis in 18 months. This, according to them, is different from beri-beri occurring in pregnant women. The symptoms were weakness of both the legs and inability to walk, coming on three or four weeks after pregnancy. In all these cases there was a slight white discharge from the uterus. Col. Hingston suggested sub-involution and sepsis as the cause of the condition, as the patients got well when the discharge stopped.

The present series.—In our series of 24 cases, observed during fifteen months, there was discharge from the uterus in only one case, and no septicæmia or toxæmia. The infant was invariably nursed by the mother and grew satisfactorily.

TABLE

Cases of polyneuritis admitted into the medical wards during the past fifteen months

Sex and condition	Number of total admissions	Number of cases of polyneuritis	
Males ..	1,737	54	About 3 per cent.
Females ..	415	24 } Puerperal.	About 6 per cent.
		3 } Non-puerperal.	Under 1 per cent.

The mean age of the 24 cases of post-puerperal polyneuritis was 28 years, the youngest was 16 and the oldest 50. Ten of these were primiparæ. There was one death, and 15 were relieved of their symptoms at the time of discharge.

History and clinical picture.—The typical history of a woman admitted for polyneuritis during the puerperium was as follows. The woman went through her period of pregnancy and labour without any untoward event. She had been on a special diet for a fortnight after labour, but from the history there was nothing to suggest any noxious dietetic principle likely to cause polyneuritis. About two to three months after the labour, the patient had subjective symptoms of tingling shooting pains, cramps, etc., in the legs, often severe at night. About 30 per cent of cases gave a history of general anæmia and fever for about ten days preceding the attack of neuritis. Later, there

was weakness of the legs with inability to walk without help. The feeling extended to the upper extremities in more than 50 per cent of the cases.

On admission, a distinct wasting of the muscles of the lower extremities was noticed, with the feet in the drop position. The calf muscles were tender. Deep reflexes were lost. The soles were hyperæsthetic and a flexor response was elicited in most cases. The abdominal reflexes were always present. The patient occasionally complained of heaviness in the chest, but had no appreciable dyspnoea at rest or on moderate exertion. A few patients showed œdema of the legs persisting after the original anasarca had disappeared.

The infants in about seventy per cent of the cases were alive and healthy, with the mother suckling them. The temperature was normal, but the pulse was invariably in the neighbourhood of 100. The blood pressure was normal in sixty per cent of cases, moderately raised in the rest. The heart was normal on physical examination, and the urine had no albumin.

For comparison with this picture that of cases of 'beri-beri' admitted on the male side about the same time is given. Sturdy well-built men, between 30 and 45 years of age, were admitted with diffuse œdema over the neck, chest and limbs, and complaining of cramps and tingling in the extremities. The patients were often dyspnoic, though they preferred the recumbent posture. On physical examination, the heart was often found enlarged, and the sounds feeble or replaced by a murmur. The blood pressure showed a distinctly low figure for diastole and often for systole as well. In about half the cases treatment with minute doses of adrenalin was of no avail. With the others, rest and adrenalin with vitamin B in the form of Bemax, yeast, marmite, germinating 'gram' or toddy had a delayed but satisfactory effect.

Diet: The diet of an average individual admitted with signs and symptoms of polyneuritis did not materially differ from the diet of the patients in the ward who were not suffering from this disease; the proportions of carbohydrate, protein and fat work out roughly at 10:2:1.

Discussion.—A study of the literature on polyneuritis shows that it is not a recognized complication of the puerperium.

Other possible coincident factors to account for this ailment were absent, such as alcohol, lead, arsenic, mercury, organic or vegetable toxin. There is the possibility of auto-intoxication. Apart from our failure to detect such a source, polyneuritis of the puerperium has not been observed in such numbers anywhere else, as far as our knowledge goes, except in one other area, referred to below, where beri-beri is endemic.

It is then to be decided if the condition is a variety of beri-beri and if so what causes the

high incidence during the puerperium. There is evidence for the assumption that the condition—be it a toxæmia, toxi-infection or vitamin lack—tends to assert itself as a neuritis after devitalizing states, such as fever, or in a woman after the strain of pregnancy, parturition or lactation. Often the first pregnancy was the inauguration of this symptom-complex. Grey (1928), while investigating the 'pre-beri-beri' condition with special reference to its existence in Japan, observed that in any deficiency disease two conditions are essential, *i.e.*, the accessory factor and the factor to which it is accessory. Though an adequate supply of vitamin B may hide the ill-effects of an unbalanced diet there must be an underlying weakness in the organism and this may suddenly become manifest when the vitamin is withheld. Such an underlying weakness might be expected to develop into true beri-beri without any diet changes merely as the result of adverse conditions such as excessive heat or humidity, lack of exercise, fatigue, and super-added intoxication—and pregnancy, if we may add to his list.

Acosto-Sison (1928) while investigating neuritis in the Philippines noticed that it was quite common among the Philippine parturients. Many of his co-workers held the view that the condition was beri-beri. The babies of mothers so affected, when breast fed, succumbed to infantile beri-beri. Paræsthesia and tingling were present over the trunk and extremities, and occasionally œdema. The last two months of pregnancy were the most usual time for the occurrence and in some cases the symptoms disappeared with parturition. In some the symptoms persisted for two or three months after labour and in the extreme grades of the disease, *i.e.*, those showing muscular wasting and foot drop, recovery took five months or more. No differences in diet were found between the sufferers and non-sufferers. Semi-polished rice, fish and vegetables formed the main part of the diet.

This author was inclined to the view that the condition is a toxæmia of pregnancy. True beri-beri cases seen in the Philippine General Hospital tended to be immune after one attack, but in the malady under discussion the symptoms often recurred in successive pregnancies. It is interesting to note that the neuritis is by far the most frequent in primiparæ, both in his series and ours. He also mentions the possibility of pressure on pelvic nerves as a possible causative factor.

What baffles us, while reading the report, is why a similar neuritic condition, if it is just a toxæmia of pregnancy or pressure on pelvic nerves, should not have been observed in other parts of the world, whereas in our search of the literature on this subject we can only find references to similar conditions in areas where beri-beri is present as well.

Acosta-Sison summarized his observations by saying that beri-beri does exist both in mothers and babies, but that all neuritic symptoms among parturients are not of beri-beri origin. One observation of his which tallies with ours is that mothers who have beri-beri, or rather polyneuritis, rear quite healthy babies. The point that strikes one in this observation is that beri-beri is possibly not a toxæmia, or at any rate the toxin is not inimical to the growth of the baby. Avitaminosis as the sole factor in the causation of beri-beri is not a tenable hypothesis, in the light of many investigations. Even if it is due to toxins, two factors are necessary for the manifestation of the symptoms of beri-beri—the 'predisposing' and the 'exciting', let us call them for want of better terminology.

Chopra and Acton (1925) in concluding their elaborate observations on beri-beri said that susceptibility played an important part when the amount of poison ingested was small. They instanced the small incidence of beri-beri in a jail population with a constant diet. Hypo-adrenalæmia in particular and hypo-thyroid to a lesser extent increase the susceptibility towards the poisonous bases which cause epidemic dropsy and beri-beri. They cited the colour of animals as markedly affecting the ease with which beri-beri could be produced, and pointed out that colour is associated with the endocrine mechanism. Autopsy of beri-beri cases often showed hypertrophy of the suprarenals. That there is deficient adrenalin in circulation and that an effort is made by the hypertrophy of the glands to make good the deficiency, seems to be fairly evident.

Does pregnancy bring about a condition of hypo-adrenalæmia or is there an exhaustion of adrenal activity immediately after labour which precipitates the symptoms of beri-beri when the other factor is already present.

Cannon (1929) has formed a very definite view regarding the ætiology of beri-beri, based on two years' observation in over 600 Chinese patients and 80 autopsies, helped by animal experiments. He says in conclusion, 'beri-beri is a syndrome of the orient confined to orientals chiefly males—seasonal in occurrence, prevalent during the wet season—partly infective—a rice disease—brought about by three factors (1) water-soluble vitamin B deficiency, (2) a bacterial infection closely resembling or identical with *B. asthenogenes* of Bernard (1919) and (3) an endocrine organ disturbance'.

Shiroki and Zakeshi (1929) claim that beri-beri is a syndrome caused either by lack of vitamin B or increased excitability of the sympathetic nervous system—a condition of neurasthenia sympathetica. By repeated electrical stimulation of the sympathetic nerves in the legs of rabbits, a condition resembling human beri-beri was produced. The incidence of beri-beri is

(Continued at foot of next column)

STUDIES IN UNTREATED MALARIA

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MALARIA DUE TO *P. vivax*

Introductory

DURING the last few years, the treatment of neural syphilis by the artificial induction of

(Continued from previous column)

correlated by these authors with climatic and meteorological conditions, age, sex, pregnancy and other factors that influence the sympathetic mechanism.

The unstable sympathetic system associated with pregnancy and labour and the concomitant upset of endocrine balance have, to our minds, a great deal to do with the appearance of symptoms of polyneuritis after parturition, in an area where the other contributory causes of beri-beri are present.

Conclusions

(1) Peripheral neuritis is not a commonly recognized complication of pregnancy nor of the puerperium.

(2) Peripheral neuritis is common in the puerperium in Vizagapatam, which is an endemic area of beri-beri.

(3) These cases differ in their clinical picture from those of true beri-beri.

(4) These cases are to be regarded as peripheral neuritis occurring in persons who are otherwise predisposed to beri-beri.

(5) Pregnancy—particularly in the later months—and the strain of labour seem to induce endocrine imbalance or other disturbance, and it is suggested that this may be the mechanism by which an attack of peripheral neuritis of this type is precipitated during the puerperium, in persons living in an endemic area.

Our thanks are due to Drs. G. Dinker Rao and P. Arunachalam for their valuable help and for the permission to utilize their case records.

REFERENCES

- Acosta-Sison, H. (1928). *Journ. Philippine Islands Med. Assoc.*, Vol. VIII, p. 230.
Acton, H. W., and Chopra, R. N. (1925). *Indian Med. Gaz.*, Vol. LX, p. 1.
Cannon, A. (1929). *Brit. Med. Journ.*, Vol. II, p. 852.
Churchill, F. (1854). *Dublin Quart. Journ. Med. Sci.*, October, p. 257.
Grey, E. C. (1928). *Journ. Hyg.*, Vol. XXVII, p. 257.
Kamath, M. L. (1931). *Indian Med. Rec.*, Vol. LI, p. 289.
Mahadevan, V., and Raman, T. K. (1930). *Indian Med. Gaz.*, Vol. LXV, p. 555.
Mobius, J. (1887). *Münchener Med. Woch.*, Vol. XXXIV, p. 153.
Rogers, L., and Megaw, J. W. D. (1930). *Tropical Medicine* J. and A. Churchill, London.
Seitz, H. (1892). *Biol. u. Path. Wochs.*, Vol. VII, Part I, p. 857.
Shiroki, T. (1929). *Japan Med. World*, Vol. IX, p. 141.
Von Hosslin (1905). *Arch. Psychiat.*, Vol. XL, p. 445.
Wilson, K. M., and Garvey, P. (1932). *Amer. Journ. Obstet. and Gyn.*, Vol. XXIII, p. 775.

malaria has offered a unique opportunity for studying the process of invasion of the blood by malarial parasites, and the early clinical manifestations of malaria. In this sphere, the work of James (1926 and 1926a) is outstanding. His findings are of such importance that they might be quoted fairly fully.

He found that *primary infections* by *P. vivax* produced usually the following manifestations:—

(1) An initial stage lasting from two to five days with sub-continuous, and later, remittent fever with no rigors, followed sometimes by an intermission of 24 or 48 hours.

(2) A developed stage which in 80 per cent of cases was characterized by quotidian (not tertian) inter-mittent fever with rigors, this stage often lasting more than 10 days.

(3) A terminal stage characterized by fever of tertian type.

He found that a second attack, produced by a new infection, showed a clinical picture quite different from the primary attack, the fever being tertian from the start. He found that relapses showed the same characteristics as the second attack, the fever being nearly always of true tertian type. He attributes the quotidian fever of the primary attack to the fact that the parasites do not all mature at the same time, several crops of parasites maturing at intervals and producing the sub-continuous fever of the initial stage. Later, two of the crops, each maturing on alternate days, became dominant, thus causing the quotidian fever of the developed stage; later still, one of these crops died out leaving only one main crop, resulting in the tertian fever of the terminal stage.

These findings of James were made in artificially-induced malaria in England. It is important to discover if the same findings are true of naturally-acquired malaria in countries such as India. This was one of the main objects of the work reported in this paper.

A second object was to study the phenomenon of spontaneous arrest, and to find out with what frequency it occurred and whether it was permanent. The importance of this branch of study was obvious. In testing the therapeutic efficacy of anti-malarial drugs, the recovery rate and subsequent relapse rate are usually recorded, but it is often insufficiently realized that there is a considerable spontaneous recovery rate, and that this recovery is not always followed by a relapse, even in the absence of any further malarial treatment whatsoever.

of study

Lep... hospital, Dichpali, Hydera-
was working in 1931,
good opportunity for the
d. There were many
there for years, their
known, since careful
every case with fever had
several years. The patients
control and every necessary
made. The malaria season
October, so during this season
nts with fever were examined
fever started, and, if the fever
were admitted to the sick
temperature records being

kept, and blood examination performed four times daily. This four-hourly blood examination included a total parasite count by the method of Sinton (1924), and a differential parasite count, the parasites being classified as rings, trophozoites, schizonts and gametocytes.

The numerical studies made will be discussed fully in another paper. In the present paper we deal only with the clinical findings and the main findings of blood examinations.

Thirty-seven cases of malaria due to *P. vivax* were chosen as having previously shown no manifestations of malaria since admission to the institution, which was at least one year previously and in most cases considerably longer. Three cases of relapse were investigated for comparison. All the forty patients were kept without quinine until the character of the fever had been investigated. At this stage 24 patients were given quinine and were not investigated further. The remaining sixteen however were kept without quinine for longer periods in order to observe the phenomenon of spontaneous arrest.

It should be clearly understood that most of our 'fresh' cases were probably not primary infections. The patients lived in areas where malaria was endemic, but not highly endemic, and they had probably had malaria before. This probably had an influence on our findings.

Clinical findings

(a) *Onset*.—The first point to notice is that in all these cases the first symptoms were headache, pains in the limbs and a definite rigor followed by fever. In three cases only, vomiting occurred. There were no really serious symptoms, such as collapse or coma.

Manson-Bahr (1921) states, of malaria in general, that 'two-thirds of the rigors come off between midnight and midday', yet, strange to say, the typical benign tertian temperature chart he reproduces shows rigors between 4 and 5 p.m. and his charts of quartan and malignant tertian also show the highest temperatures after midday. His statement is certainly not verified in the present series of cases, in fact of 71 rigors due to *P. vivax*, 66 occurred between midday and midnight. In these cases rigors were observed on 71 occasions, and the times were as follows:—In 31 cases the rigor occurred between 12 midday and 3 p.m., in 25 cases between 3 p.m. and 6 p.m., and in 7 cases between 6 p.m. and 9 p.m., in 1 case at 3 a.m., and in 4 cases between 9 a.m. and 12 noon. The matter of the time of rigors is discussed more fully later.

(b) *Development of the fever*.—Nearly all the patients came for examination within an hour or two of the first rigor, and the temperatures recorded varied from 101° to 104°F., with an average of 102.8°F. In nearly every case the temperature fell to below normal within six or seven hours, and remained normal or sub-normal

until the next rigor, which usually occurred about 24 hours after the first. Sometimes the second rigor and fever were less severe and sometimes more severe than the first, but in no case, even after several rigors, did any symptoms develop which suggested that the patient's life was in danger. There were pyrexia, headache, pain in the limbs and occasionally vomiting. In between the rigors the patients felt fairly well but weak.

(c) *The relation between blood findings and the type of fever.*—Early in this investigation it became obvious that there was an intimate connection between the blood findings and the type of fever. All the fevers in malaria due to *P. vivax* were found to be intermittent but some patients showed a rigor every day and some every other day. Blood examination

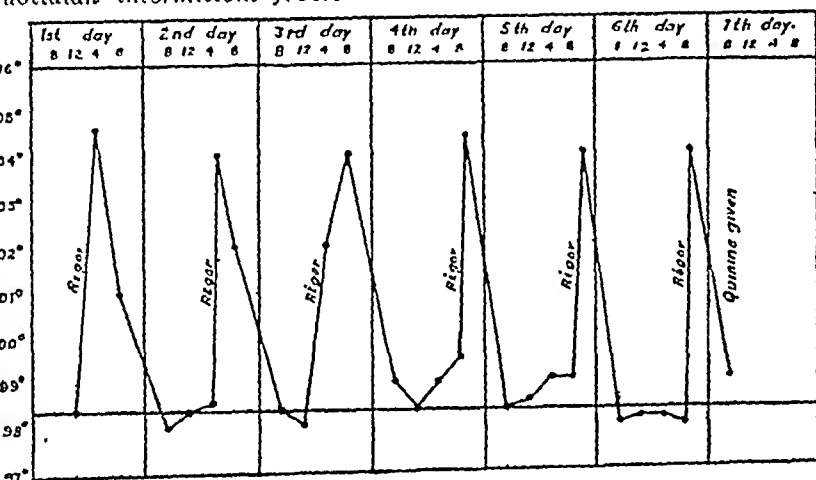
infection was on the decline and would no doubt have been arrested in time. In the other 11 cases the parasites disappeared without any treatment, but two of these patients had a slight relapse which again cleared up without quinine. (The records of a typical case are reproduced below.) In these 11 cases showing spontaneous arrest, the duration of symptoms after the first rigor varied from 3 to 14 days with an average of 6 days. Five other patients were kept for 8, 7, 5, 4 and 3 days without quinine and still showed moderate infection. One patient showed increasing infection for four days.

Relapse.—All the 40 cases were kept under close observation for several months after arrest of the fever; temperatures were taken at 4 p.m. each day for two or three weeks, and then two

CHART I

fresh infection with *P. vivax*.
quotidian intermittent fever.

Patient G. B.



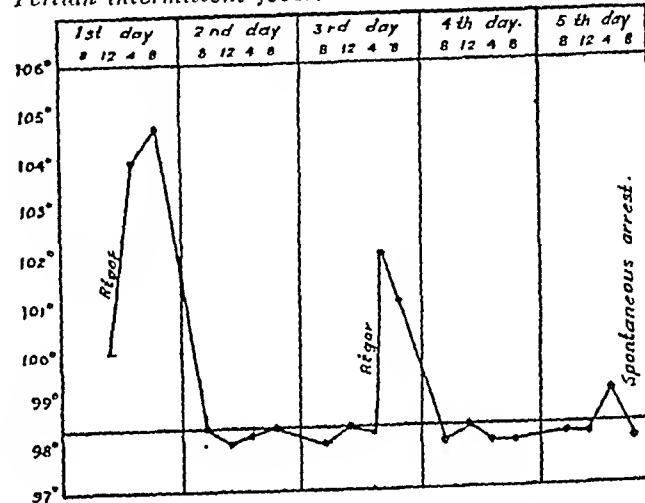
showed that those patients with daily rigors always showed two distinct main crops of parasites in the blood, with a difference in growth of the two crops corresponding to a difference in age of about 24 hours. For example, patient G. B. on the first examination at 12 noon showed part-grown trophozoites, results of schizogony completed the previous evening, and also some full-grown trophozoites and early schizonts due to mature in a few hours, which they did at 4 p.m. that day causing another rigor less than 24 hours after the first rigor. Careful examination showed that in every case with daily rigors the finding of two main crops of parasites was made in the blood. In those cases (10 in number) showing only one main crop of parasites, rigors every other day were observed.

(d) *Spontaneous arrest.*—In 16 cases of malaria due to *P. vivax*, quinine was withheld for varying periods in order to observe whether spontaneous arrest would occur, but in five of these cases quinine was given later, not because the patients were in real danger, but because the daily rigors had such a weakening and depressing effect. In almost every case the

CHART II

Relapsing infection with *P. vivax*.
Tertian intermittent fever.

Patient P.



or three times a week, the blood examinations being made frequently by the thick film method.

Of 29 treated cases, none showed relapse during the ensuing six months. (The treatment given consisted of cinchona febrifuge, gr. 24 a day for one week, gr. 12 a day for the second week.)

Of 11 cases showing spontaneous arrest, in two there was a relapse, in each case slight and subsiding spontaneously in a few days. In one of these two cases a second relapse occurred; it again subsided spontaneously, and no further relapse occurred during the ensuing few months. All cases of relapse showed one single crop of parasites in the blood and the typical tertian fever of the textbooks.

One patient, about three weeks after spontaneous arrest of malaria, showed, at daily routine blood examination, a recurrence of parasites in the blood. Parasites were found for two days in small numbers, the parasite count not rising higher than 50 per cubic millimetre. The patient had no fever and felt quite well. The parasites disappeared spontaneously.

Records of a case of quotidian fever

Date	Time of rigors	Time of examination	Temperature in degrees F.	Total parasite count per c.mm.	DIFFERENTIAL PARASITE COUNT IN PERCENTAGES			
					Rings	Trophozoites	Schizonts	Gametocytes
20-9	4 p.m.	4 p.m.	101.6	10,500	44	49	..	7
21-9	3 p.m.	8 p.m.	102.0	12,000	28	62	..	10
"	..	8 a.m.	99.0	10,000	..	88	6	6
22-9	..	12 noon	100.0	9,900	2	86	3	9
"	1 p.m.	..	..	..	..	..	..	..
"	..	4 p.m.	103.0	12,700	2	89	1	8
"	..	8 p.m.	99.0	11,500	13	72	..	15
23-9	..	8 a.m.	98.0	9,600	2	43	43	12
"	..	11 a.m.	..	9,000	67	24	..	9
"	..	12 noon	98.4	8,160	46	34	3	17
"	2 p.m.	2 p.m.	105.4	7,300	24	53	8	15
"	..	4 p.m.	103.0	6,700	13	67	6	14
24-9	..	8 a.m.	98.0	2,200	..	20	67	13
"	..	10 a.m.	98.0	..	..	21	66	13
"	..	11 a.m.	98.0	..	..	24	64	12
"	..	12 noon	98.0	1,700	..	45	35	20
"	4 p.m.	4 p.m.	101.6	9,200	50	28	6	16
25-9	..	8 a.m.	97.0	1,500	..	100	..	..
"	..	12 noon	97.8	700	..	98	..	2
"	..	4 p.m.	..	200	..	100	..	..
"	..	8 p.m.	..	less than 100	..	few	..	few

On the 26th September at 8 a.m. only one trophozoite was found in a thick film. Subsequently repeated daily examination showed no parasites till 8th October when a relapse occurred which also cleared up spontaneously. The patient was examined weekly for several months but showed no parasites or fever.

Discussion

We are now in a position to discuss the findings of Manson-Bahr and James, quoted above, and to compare them with the present findings.

The time of the rigor.—The difference between these findings and the dictum of Manson-Bahr (1921) concerning the times of rigors are very striking, and there must be some explanation. Manson-Bahr does not state in what type of patient or in what country the observations he records were made. In India in both European and Indian patients the rigors seem to occur most frequently between 2 and 4 o'clock in the afternoon. Lieut.-Col. Knowles informs me that he personally while in India has had malaria due to *P. vivax* with several relapses and invariably the rigors have occurred between 2 and 3 p.m., and that this personal observation has been verified in nearly all the malaria cases he has dealt with.

As far as we have been able to trace, the only work done on the factors governing the time of the rigor is that done in avian malaria by Boyd (1929). By keeping infected birds in the dark during the day and in bright light during the night, he found that within three days the time of the rigors shifted from the evening to the corresponding morning hours. This is a very interesting finding, but it is not clear whether the change was due to the change in the hours of light, or to associated changes in the hours of feeding, exercise and sleep. We would suggest that the time of rigor may be

affected by all these factors, light, food, exercise and sleep, and that in some countries in seasons when the sun rises early and where food and exercise are taken early, the rigors occur early in the day. In India the sun rises comparatively late, and only very light food is taken early in the day, the first real meal being taken at about midday. This we think may help to cause the later rigors. Quite possibly the time of the rigor may be affected by the amount of blood sugar which tends to rise after a meal and after exercise. The work of Hegner and MacDougall (1926) and MacDougall (1927) has shown that the growth of malaria parasites is favoured by an increase and partly inhibited by a decrease in the blood sugar. This fact may be of importance in governing the time of the rigors. These are only suggestions and they need investigation.

Initial stage.—James reports from 2 to 5 days of gradually increasing fever with rigors. In the present series of cases this initial stage was either so slight as to evade detection, or else absent. James says that the initial fever is absent in people who have had malaria before. The present series of cases were all fresh, but not primary, infections. Probably most of them had had malaria before, perhaps several years before. This fact may explain the absence of the initial stage.

Developed and terminal stages.—James reports in from 80 to 90 per cent of cases a developed stage of daily intermittent fever with rigors,

lasting 10 days or more. Our findings in the present series of cases are the same as those of James, namely that infection by *P. vivax* usually produces daily rigors. The percentage in the present series is 72 showing daily rigors. Regarding the duration of the developed stage our present findings give little evidence, for no cases have continued under observation and passed from the developed stage of daily rigors to the terminal stage of tertian rigors, as they have either cleared up spontaneously or else been given quinine before this could occur.

Relapse.—James says that relapsed cases show tertian fever from the start. Three of our patients, who have up to the present had a relapse, showed with the relapse a tertian fever, while their primary attack showed daily rigors. Our experience of malaria and relapse during several years supports James' findings.

Re-infection.—James states that re-infection produces tertian fever. Most cases of the present series must almost certainly have had malaria before, yet most of them show daily rigors. In this respect the present findings do not support James. A possible reason for this is that, in James' cases, re-infection occurred within five months of the first infection and while there was still some immunity, but in the present series the patients have been free from malaria for at least a year and usually much longer. We suggest that James' statement may be true only for a limited period, and that after that period has passed daily fever with rigors is commonly seen in re-infection.

Spontaneous arrest.—Every case in which quinine was withheld for a sufficient length of time underwent spontaneous arrest. Our opinion is that in Hyderabad most cases of malaria due to fresh infection of *P. vivax* undergo spontaneous arrest within two weeks. Relapse may occur but not by any means in all cases. Fresh cases of malaria are very common in the rainy season and shortly afterwards. Chronic malaria is much less commonly seen. Among about 2,500 patients who have passed through this institution (a leprosy hospital) in eight years, enlarged malarial spleens have been seen in about a dozen cases, whereas between fifty and a hundred fresh cases of malaria are seen every year. This is in marked contrast to the findings of most workers on malaria due to *P. vivax*. Knowles states, 'Almost all cases of malaria encountered in hospital in Bengal are of the endemic, chronic or residual type'. Even making allowance for the difference between hospital and institutional work, we think that chronic malaria is much less common in the rural areas of Hyderabad than one would expect. There are practically no data concerning spleen rates, etc., in rural areas of Hyderabad, but the writer's experience is that the spleen rates are extraordinarily low when the high incidence of malaria in the rainy season is considered. In the city of Hyderabad, spleen rates

in children have been recorded and it is found that they vary tremendously in different parts. Some areas show 80 per cent and other adjacent areas only 3 per cent. There seem to be marked differences between city and rural areas, and also between various parts of the city. The whole subject is one needing careful investigation and it cannot be dealt with here.

On the whole then our clinical findings support those of James but there are certain differences which may be summarized as follows:—

(1) The initial stage of James is either so slight as to be undetected, or absent.

(2) Re-infection, if it occurs a long time after the previous infection, usually produces daily rigors and fever, and not tertian rigors and fever.

(3) Most cases become spontaneously arrested before the 'terminal stage' of tertian fever.

The explanation for these differences probably lies in differences in the type of patient. James' patients with fresh infection were all cases in England where endemic malaria is practically non-existent, and they could have developed no immunity as the result of previous infection. The present cases were all patients in an area where malaria is endemic and they all probably have some immunity as the result of previous attacks. James' re-infected patients were all re-infected within five months of the initial attack. Our patients were mostly re-infected cases but the previous infection took place at least one year and probably several years before.

The important clinical finding of James, which the present findings support, is that infection by *P. vivax* usually produces at first an intermittent fever with daily rigors and not with tertian rigors as is described in most textbooks. The phenomenon of a daily rigor is explained by the finding that the parasites mature in two main crops with an interval of about 24 hours between them. It has long been known that patients with malaria due to *P. vivax* may show daily rigors, but this was regarded as exceptional, and in most textbooks it is attributed to 'double infection'. Exactly what is meant by 'double infection' is not clear. Some writers imply, but do not state definitely, that it is due to bites by infected mosquitoes on more than one occasion, the parasites maturing at different times. Others use the term 'double infection' with no explanation. The finding of James and our present findings show that the daily rigor is not the exception but the rule in fresh cases, and that it is caused by one infection only, the parasites maturing in two main crops.

The daily rigor has a most weakening effect on the patient. A patient who has had tertian fever for a week, even if it is severe, often walks about and feels fairly well in the intervals between the fever, but a patient who has had daily rigors for the same time is usually so weak and exhausted that he can do practically

nothing. The daily fever is much more than twice as exhausting as the tertian fever, for the patient has little interval between the rigors in which to recover his strength.

The present blood findings

James' findings are in general agreement with the present findings. The only difference is that we feel that a definite division into two crops of parasites is possible more frequently and at an earlier stage than James indicates.

In all forms of malaria, even in the classical benign tertian malaria, the parasites are never found exactly at the same stage of development. The rupture of mature schizonts is spread over several hours and the rigor occurs at the height and not at the beginning of this process. Thus, in a case of malaria due to *P. vivax* with tertian ague and only one crop of parasites, rings and mature schizonts are found together in the blood for several hours in varying proportions, from an hour or two before the rigor to an hour or two after the rigor. When two crops of parasites are present the blood picture is more complicated, and rings, early trophozoites, half-grown trophozoites and schizonts are often seen together, but it is usually possible to place 90 per cent of the parasites in one or the other main crop. The other 10 per cent may be doubtful but this is only to be expected and does not materially affect the general finding that the parasites are in two main crops.

To demonstrate this matter clearly, a relapsed case showing a typical tertian fever due to *P. vivax* was investigated, very careful differential (asexual) parasite counts being done every four hours, and the parasites classified as follows: rings and early trophozoites—T1, half-grown trophozoites—T2, full-grown trophozoites—T3, immature schizonts—S1, and mature schizonts—S2. The results for two days were as follows:—

	T1	T2	T3	S1	S2
12 noon	..	95%	5%	..	..
4 p.m.	..	31%	69%	..	..
8 p.m.	..	3%	97%	..	..
8 a.m.	29%	62%	9%
10-30 a.m. (rigor 11 a.m.)	14%	81%	5%
12 noon	..	25%	..	70%	5%
4 p.m.	..	75%	..	..	25%

Here is one main crop of parasites but there are minor differences in development. At each examination parasites in at least two stages are seen but the difference in development is slight and they all obviously belong to the same main crop. Rings are found only about the time of the rigor and there is apparently no schizogony going on at other times. If we consider the two counts taken at 12 noon (the rigor occurred at 11 a.m. the second day) we find that all forms of parasites are present on one or other occasion. Now, if in one patient we have two main crops of parasites one maturing each

twenty-four hours, and if we make a blood examination one hour after the rigor, we should expect to get a blood finding similar to that obtained by adding together the blood examination results obtained at 12 noon on successive days in the above patient who showed only one crop of parasites. This is what we actually do find. Below is given a typical differential count actually made one hour after the first rigor in a patient showing two main crops of parasites, compared with a composite count made by adding the noon counts on two successive days of the patient showing a single crop:—

	T1	T2	T3	S1	S2
Actual count	27%	59%	3%	9%	2%
Composite count	12.5%	47.5%	2.5%	35%	2.5%

This shows that the finding of some parasites at all stages does not necessarily prevent a division into two main crops. The one crop here is represented by part-grown and full-grown trophozoites (T2 and T3) and the other crop by schizonts immature and mature, and early ring trophozoites (S1, S2, and T1).

The strongest proof that, in such cases as the one just quoted, the parasites are in two main crops is the fact that the early ring form of trophozoite is found, as a rule, only for certain limited periods, namely, for a short time before the rigor till two or three hours after the rigor. The rigors occur every day, and are caused by the completion of schizogony in one of the two crops of parasites.

During the present investigation, when a case of malaria came for examination after the first rigor, we found it possible in nearly every case from the study of a single blood film to predict the form the fever would take (whether quotidian or tertian), and if the time of the taking of the blood film was known, we could make a fairly accurate prediction of the time of the next rigor. The correspondence between blood findings and the type of fever was most striking, and was one of the outstanding facts demonstrated in the present enquiry.

Two main crops of parasites with quotidian fever were observed in 27 of 37 cases of malaria due to fresh infection by *P. vivax*. In one case the crops were not apparent at the first but only became apparent at the second examination.

MALARIA DUE TO *P. falciparum*

It was found impossible to carry out a similar thorough investigation of the fever produced by fresh infections of *P. falciparum*. The severe nature of the fever made the withholding of treatment for more than a short time a dangerous and unjustifiable procedure. Twenty-one cases of malaria due to *P. falciparum* were observed, and in eight of them quinine was withheld for periods varying from four to forty-eight hours from the time of making the diagnosis. The following is a summary of the observations made.

Clinical findings

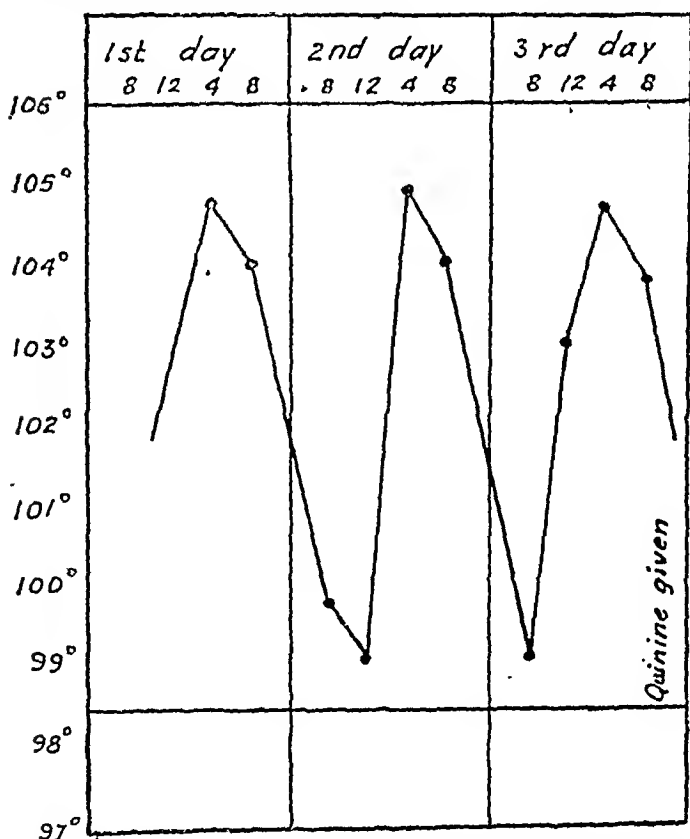
The onset.—The onset was not nearly as sudden as in *P. vivax* infections. In very few of the patients was there a definite rigor with shivering. Usually there was a sensation of cold, headache and pains in the limbs. The symptoms increased until in most cases there was vomiting and some degree of collapse. The time of the onset of these symptoms was usually between 2 and 6 p.m. The temperature taken shortly after the onset varied from 101° to 105° with an average of 103.4°F.

The development of the fever.—Shortly after the onset the fever was high and remained high for several hours that evening. The next morning the fever in most cases was less, but the temperature was practically never normal. In most cases the temperature rose again about midday or shortly after, with a recurrence of the severe symptoms described above. In other cases the fever and other symptoms remained

CHART III

Fresh infection with *P. falciparum*.
Quotidian remittent fever.

Patient I. B.



slight during the second day and severe symptoms did not show themselves till the third day. One case took a hæmorrhagic form with petechial hæmorrhages in the skin, hæmaturia (bright-red blood), and bleeding from the bowel.

All cases after 48 hours (or before if necessary) were given quinine and had an uninterrupted recovery. All cases observed for a sufficient period showed a remittent, not an intermittent, fever. Four cases showed a tertian periodicity and four cases showed a quotidian

periodicity. One case showed continued high fever for 24 hours with no remission before quinine was given. The remaining 12 cases were given quinine before the periodicity became apparent.

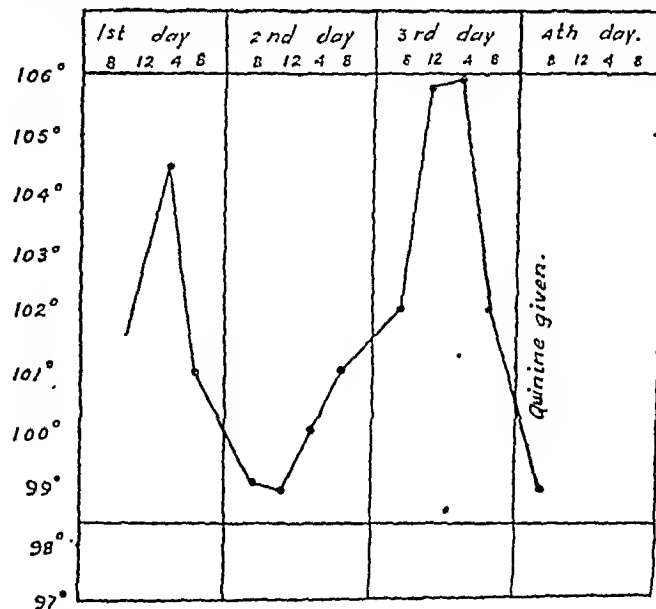
Blood findings

The only form of the parasites seen in the peripheral blood in fresh cases was the early trophozoite, usually in its ring form, but the marginal forms were also common in the heavier infections. The number of parasites was always highest after the high fever and fell markedly when the temperature fell, but in the periods of remission of fever the only form seen was still the young trophozoite. There are three reasons for this. Firstly, *P. falciparum* retains the ring form for a long period, according to Thomson and Robertson (1929) as long as 24 hours in some cases. Secondly, all parasites disappear to the internal organs after about 24 hours growth. Thirdly, there appears to be

CHART IV

Fresh infection with *P. falciparum*.
Tertian remittent fever.

Patient E. G.



some schizogony going on continually, small numbers of early ring forms appearing in the peripheral blood every few hours. In addition to this slight amount of continued schizogony all cases showed periods of heavy schizogony. In some cases these occurred every 24 hours and in others every 48 hours. Thus the parasite counts were apparently made up of numerous small groups maturing at any time and either one or two main crops maturing at mid-day, or shortly after. The parasites belonging to the same main crop did not mature simultaneously. This process was spread over several hours.

The relation between the blood finding and the type of fever.—All cases observed showed a remittent, not an intermittent, fever, but some showed a quotidian periodicity and some a tertian periodicity. A study of the blood findings

helps to explain this. Schizogony was going on all the time to a mild degree, hence the temperature did not return to normal and the fever was remittent. The differing periodicity depended on whether there was one main crop, or two main crops with a difference of 24 hours in their development. Those patients with only one main crop showed a tertian periodicity. The fact that the maturing of the main crops was spread over several hours with a gradual, not a sudden, increase in the parasite count probably accounts for the fact that there was a gradual and not a sudden rise of temperature.

Summary

(a) Malaria due to *P. vivax*.

A study is made of thirty-seven cases of malaria due to fresh (but probably not primary) infection with *P. vivax*. Twenty-seven of them showed a quotidian intermittent fever. The rigors occurred usually after mid-day. Relapsed cases showed a tertian intermittent fever. The quotidian fever in fresh infections is found to be due to the parasites maturing in two main crops on alternate days. Most of the findings of James (1926) in experimentally-induced malaria are verified in this series of cases of naturally-acquired malaria. Eleven cases kept entirely without quinine showed spontaneous arrest of fever within two weeks, and in only two of these cases was there a relapse; these relapses subsided spontaneously.

(b) Malaria due to *P. falciparum*.

Twenty-one cases of fresh (but probably not primary) infection with *P. falciparum* were observed. In eight cases quinine was withheld for a time. Four of these cases showed a quotidian remittent fever, and four showed a tertian remittent fever. The fever was not intermittent because there was some sporulation of the parasites occurring all the time, but in addition there was either one or two main crops of parasites sporulating about midday, causing either a tertian or a quotidian periodicity.

Acknowledgment

My thanks are due to Dr. E. B. Christian, without whose very valuable assistance this work could not have been done.

REFERENCES

- Boyd, G. H. (1929). Induced Variations in the Asexual Cycle of *Plasmodium cathemerium*. *Amer. Journ. Hyg.*, Vol. IX, p. 180.
 Hegner, R. W., and MacDougall, M. S. (1926). Modifying the Course of Infections with Bird Malaria by changing the Sugar Content of the Blood. *Amer. Journ. Hyg.*, Vol. VI, p. 602.
 James, S. P. (1926). *Report on the First Results of Laboratory Work on Malaria in England*. Geneva: Publication of the League of Nations. (C.H./Malaria/57-1).
 James, S. P. (1926). Epidemiological Results of Laboratory Study of Malaria in England. *Trans. Roy Soc. Trop. Med. and Hyg.*, Vol. XX, p. 143.

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CONJUNCTIVITIS PRODUCED BY A GROUND BEETLE

By R. N. CHOPRA, M.A., M.D. (Cantab.)

LIEUTENANT-COLONEL, I.M.S.

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ONE evening in Calcutta about the middle of October soon after dusk when the writer was sitting in his car, which was stationary at the time, he saw a small insect flying towards him. Before he realized what was happening the insect flew straight into the lower lid of his right eye. The sensation for the time being was as if a red-hot charcoal had been put in the eyelid and for about one minute the pain was excruciating. The insect was removed from the eye by Dr. S. L. Hora of the Zoological Survey of India who very kindly took it for identification. After removal of the insect the pain and lachrymation continued, the eye became very red and congested, and the eyelids swelled up. On returning home, the writer washed out the eye with boric lotion, but the pain and watering continued throughout the night.

Next morning the eyelids were more swollen and congested, and there was a good deal of stringy muco-purulent discharge. The eye was examined by the resident surgeon of the eye hospital who found the conjunctiva of both lids inflamed but no injury to the cornea. The lower lid was particularly red and inflamed, and on closer examination two small wounds could be clearly seen near each other where the jaws of the insect had dug into the conjunctival tissue. The conjunctival sacs of both lids were irrigated with warm saline and a drop of 5 per cent protargol was put in. This treatment had to be continued for 4 days and after that the eye became normal.

On examination, the insect was found to be a ground beetle of the genus *Clivina*, and so far as it could be ascertained from a small, crushed specimen, it seemed to belong to *C. helferi* Putz; but, as it was not possible to examine all the characters of the specimen under report, the specific determination is given here with considerable reserve.

The species of *Clivina* live in moist places and commonly emerge in the evening. The genus belongs to the family *Carabidae* or 'Ground beetles'. Some of these insects

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- MacDougall, M. S. (1927). The Effects of Changes in the Sugar Content of the Blood in Bird Malaria. *Amer. Journ. Hyg.*, Vol. VII, p. 636.
 Manson-Bahr, P. (1921). *Manson's Tropical Diseases*. London: Cassell & Company, Ltd.
 Sinton, J. A. (1924). *Indian Journ. Med. Res.*, Vol. XII, p. 341.
 Thomson, J. G., and Robertson, A. (1929). *Protozoology*. London: Baillière, Tindall and Cox.

possess glands at the anal extremity from which they are able to discharge a fluid which volatilizes on contact with the air, and which possesses highly caustic properties'. When handled these beetles give out an odour like iodoform.

These beetles breed and live in unclean places and, apart from the irritant substances produced by glands in their body, they carry infective germs with them.

H. E. Andrews in his treatment of the *Carabidae* in the *Fauna of British India* series (*Carabidae*, Vol. I, London, 1929) remarks that, as a means of defence, the beetles of the group *Brachinini* and of the genus *Omphra* possess glands at the anal extremity from which a highly caustic fluid is discharged on irritation or in face of danger. 'This emission is not only

visible as a kind of smoke, but is apparently audible also, and no doubt it enables the insect to seek shelter whilst its enemy is recovering from the effects of the discharge'. The members of the genus *Clivina*, to which reference is made above, belong to the group *Scaritini* and to the sub-group *Clivinides*. So far as I am aware, the beetles of this group have not been accredited with the possession of pungent, caustic secretion. The above note, therefore, adds to our knowledge of the bionomics of the *Clivina* beetles.

I am very greatly indebted to Dr. S. L. Hora of the Zoological Survey of India for his co-operation and help. The specimen is preserved in the collection of the Zoological Survey of India, Indian Museum, Calcutta.

A Mirror of Hospital Practice

A CASE OF BILATERAL MACULAR DISEASE IN A CHILD

By S. N. MITTER, B.Sc., M.B., B.S., D.O.M.S. (Lond.)
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THE macula lutea is structurally as well as functionally a specialized portion of the retina, its nutrition differing to a considerable extent from other portions. We therefore meet with lesions which are practically limited to the macula. These lesions are usually bilateral, and the commonest types are—

- (a) Senile degenerative conditions of uncertain ætiology;
- (b) Lesions occurring after acute fevers, e.g., influenza or typhoid; these are inflammatory conditions almost certainly due to toxæmia, and hence capable of improvement if treated promptly.

This second condition is seen most commonly in children, and Hughes (1931) has described some cases which he considers to be due to measles. In his cases visual acuity was low and could not be improved. He contends that it is likely that other infectious diseases may produce bilateral macular disease in children. In my opinion this is true and I consider that after every acute illness in children the maculae should be very carefully examined for any early inflammatory lesion, for slight disturbances of vision are usually not noted by the children or are ignored by the parents, and it is only by early treatment that improvement can be produced. I have recently examined a boy whose visual acuity had fallen markedly after an attack of typhoid, and whose maculae showed gross pigmentary changes. Vision could not be improved very much, and I believe that this case was similar to those described by Hughes.

The following case suggests that factors other than acute fevers may possibly be responsible for producing bilateral macular disease.

D. S., aged 9 years, was brought to me by his father, who said that the boy first complained of dimness of vision about twenty days previously but this was ignored by the parents. Three days before they came to me the father saw the boy stumbling and obviously walking with difficulty. On examination by me it was seen that vision had been reduced in the right eye to 'fingers' at 10 feet, and in the left to 'fingers' at 8 feet. Pupil reactions and tension were normal; media were clear and there was a total hyperopia of three dioptres; vision, however, did not improve with glasses. The maculae of both eyes were dark and oedematous and showed some pigmentary disturbance; in the left, the oedema had spread almost up to the papilla. The pigment was very small in amount and seemed to be coarse: neither hæmorrhage nor any exudate could be seen anywhere in the fundi. Blood vessels were not affected and the rest of both fundi seemed to be normal. The urine contained an appreciable quantity of phosphates.

Cure was rapid in this case, the patient recovering to '6/9 partial' in each eye in three weeks. The retinal oedema had entirely disappeared and the maculae presented a more or less normal appearance; some very fine pigment was, however, still left, and further improvement of vision was probably not possible owing to this. Besides local treatment with atropin, dionin and a few subconjunctival injections of normal saline, the patient had iodides and full doses of sodium salicylates internally. He was later put on Sajodin and thyroid and allowed to return home. Ten months after this he was examined again: the macular condition remained unchanged, and he was attending school normally.

This symmetrical inflammatory lesion in both maculae suggested a general cause and led to a search for any focus of infection in this apparently healthy child. No history of any acute or infectious disease could be elicited; there was no oral sepsis nor sinusitis, and the Wassermann reaction was completely negative. The skin was generally dry, and on the abdomen, arms and legs it was scaly. The father said that the child was born with this condition

(Continued at foot of opposite page)

A CASE OF ADDISON'S DISEASE ?

By GANESH CH. SARKAR, M.B.

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THE patient, a Hindu male, aged 38, a labourer, was admitted to the medical ward of the Fraser Hospital, Burdwan, on 3rd August, 1933, with rapidly-developing pigmentation of the body particularly on the extremities, puffiness about the ankles, asthenia and inability to carry on his ordinary work, and gastro-intestinal disturbances. The symptoms were of three months duration. Family and personal histories showed little of interest. Except for occasional short spells of fever he was never ill seriously. He had syphilis about four years before. For three months his relatives had

(Continued from previous page)

which became worse in the winter and improved in summer, and that temporary benefit resulted from massage with oil. This congenital ichthyosis has been observed for three generations in the family of the patient's mother, and strangely enough had affected the male members only. I examined the fundi of the patient's brothers and sisters (five in all), and found them to be normal in every respect. Although one of the affected brothers was mentally weak, so much so that he had to discontinue his schooling; the patient himself was a brilliant boy.

Whether congenital ichthyosis can be responsible for a bilateral inflammatory disease of the macula, I am not certain; but in this case this seemed to be the only factor that was present. Porter (1926) has shown that 70 per cent of children affected with congenital ichthyosis show a subnormal basal metabolic rate which suggests hypothyroidism. In this case it is possible that though there was no evidence of a definite thyroid insufficiency, this subnormal or faulty metabolism had resulted in some form of mild toxæmia which might have affected the maculae. Metabolic toxins are known to affect markedly the walls of the capillaries, and it is suggested that an increased passage of colloids through the capillary walls may lead not only to a loss of the 'pristine brilliancy' of the fundus oculi but also to definite œdema in some cases. The importance of inborn errors of metabolism in causing ocular disturbances is discussed in a recent paper by Ramsay (1933). He ends with the very pregnant suggestion that such errors may be responsible even for the toxic amblyopias, and he therefore recommends a systematic examination of blood sugar in such cases.

REFERENCES

- Hughes, N. (1931). *Trans. Ophth. Soc. U. Kingdom*, Vol. LI, p. 516.
Porter, A. (1926). *Brit. Journ. Dermat. and Syph.*, Vol. XXXVIII, p. 475.
Ramsay, A. M. (1933). *Brit. Med. Journ.*, Vol. I, p. 226.

noticed the pigmentation, but he came to hospital mainly on account of the weakness, gastro-intestinal trouble, and swelling of the ankles.

He was somewhat thin and anæmic. A blackish pigmentation was noticeable all over, but was more marked on the face, lips, neck, extremities, serotum, and penis. The skin was dry but not shrivelled; there was slight œdema around the ankles. His appetite was perverted and anorexia was marked. He complained of nausea, felt mostly in the morning, while the bowels were irregular. His teeth were healthy and the buccal mucous membrane showed pigmented spots. The tongue showed pigmentation particularly at the sides, while the palate also showed the same type of pigmentation. The conjunctivæ were pearly white with black spots near the sclero-corneal junction. The blood pressure was low—80 mm. Hg. (systolic). The pulse was feeble, easily compressible and the rate was 66 per minute. The apex beat was not marked and on auscultation the heart sounds were weak. Secondary anæmia was present, blood examination showing red blood cells—42 millions, hæmoglobin—50 per cent. The total white count—6,000. The differential count was lymphocytes—26 per cent, polymorphs—64 per cent, large mononuclears—4 per cent, eosinophiles—6 per cent. The blood sugar was 0.081 per cent, and the Wassermann test was positive (5/10). Urine examination showed no abnormality; the spleen and liver were not palpable below the costal margin.

The weakness and pigmentation suggests pernicious anæmia, but the blood picture excludes it; other causes of pigmentation and gastric disturbance must be considered, such as arsenical poisoning, abdominal growths (e.g., gastric carcinoma), but there is no history of taking arsenic. Stool examination for occult blood showed nothing. As kala-azar is excluded by the absence of either enlarged spleen or liver a diagnosis of Addison's disease was made.

The treatment adopted was of the type employed by Rowntree, and consisted in frequent administration of adrenalin hypodermically (daily five minims) and of the extracts of whole gland by the mouth to the limit of tolerance (up to 10 grains three times a day). The avoidance of fatigue and worry was strictly enforced, and absolute rest in bed was maintained. An easily digestible diet was given, and as the blood sugar level was low, carbohydrates were given liberally. As syphilis was possibly the causal factor in the case, anti-syphilitic treatment as advised by Warthin was given. Potassium iodide was given, 10 grains three times a day, increasing the dose with the progress of the case. Arsenic was not given. The tuberculin treatment was not adopted as the case appeared to be mostly of specific origin.

The patient improved rapidly, the pigmentation became much fainter, while the weakness became less and the gastro-intestinal disturbances almost subsided. He could now easily move about, his appetite returned and he was not satisfied with the food supplied to him. He left hospital fifteen days after admission. Owing to domestic reasons he could stay no longer in hospital.

(Note.—We do not feel that we can accept the writer's diagnosis without some comment.

The symptoms certainly suggest adrenal dysfunction, but this occurs in many other conditions besides true Addison's disease. We do not think that this disease would have responded in so short a period as fifteen days to the treatment that was given; on the other hand potassium iodide will often increase adrenal function temporarily. The absence of enlargement of the spleen or liver does not by any means exclude kala-azar. In both kala-azar and hookworm disease there is adrenal dysfunction; certain other symptoms in this case suggest that ancylostomiasis might have been the cause of the disability.—EDITOR, I. M. G.)

A CASE OF GANGRENE COMPLICATING TYPHOID FEVER

By R. W. THOMAS, M.B., B.S. (Lond.), D.T.M. & H.
and

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In view of the rarity of gangrene in typhoid fever, the following case appears worthy of publication:—

A Hindu male, aged 52, presented himself at the above hospital on 10th August, 1933, for treatment for his feet, from both of which all the toes were missing.

History.—Eleven months ago he had an attack of fever with headache, the fever being continuous and high for three weeks, then becoming intermittent for 10 days. During the period of high fever, he was semi-comatose. When the fever had been intermittent for a few days, the toes of both feet became quite cold and numb, and the following day both feet were greatly swollen to just above the ankles. Five days later a burning sensation was felt in the feet, and a fortnight later ulceration set in and the toes became very painful. All the toes sloughed off within three months.

At the same time that ulceration commenced in the toes, there was ulceration of the terminal phalanges of the right little finger and of the middle finger of the left hand. The patient took little notice of these and after three months he pulled off the necrosed parts and the fingers healed up.

The patient's previous history revealed nothing of note. He denied having had syphilis and there was no history of previous attacks of coldness and numbness of the extremities, nor of intermittent claudication. During the illness recorded above, he was not seen by any doctor.

Physical examination.—The patient was a well-built muscular man and appeared healthy. He walked with difficulty since all the toes of both feet were missing. There was a healing ulcerated line on each foot corresponding to the line of the metatarso-phalangeal joints. This was tender to touch owing to nerve exposure. The terminal phalanx of the little finger of the right hand was missing, and there was scarring and loss of tissue in the pulp of the terminal phalanx of the left middle finger. The feet and legs were not swollen and there was no varicosity of the superficial veins. There was no anæsthesia, but slight hyperæsthesia; and in the affected fingers slight loss of thermal sensibility was detected.

Arterial pulsation was everywhere good, and there was no atheromatous thickening of the arteries. In the left popliteal space, a cord-like thickening was palpable overlying the artery, possibly a thrombosed popliteal vein.

The blood pressure was 140 mm. Pupils were equal and reacted to light and accommodation. The left lens was cataractous. Knee-jerks were elicited. There

was no enlargement of the ulnar or external popliteal nerves; and no rash or skin lesion. The chest and abdomen were clear.

Urine.—Specific gravity—1010, acid, no albumin or sugar. Phosphates +. The Wassermann test was not done.

This appears to be a case of gangrene of the extremities in the course of some febrile disease, probably enteric fever. In considering the differential diagnosis, we may from the history and physical signs rule out such causes of gangrene as arteriosclerosis, diabetes, thromboangiitis obliterans, syringomyelia and syphilis.

Leprosy has to be considered, but there are no evidences of it in the form of anæsthesia, nerve-thickening, or skin rash, and the sudden onset in all four limbs helps to rule it out.

Raynaud's disease is a possible diagnosis, but the sudden onset in the course of a febrile disease with no previous history suggesting this disease is against it. It is unusual, moreover, for the gangrene in Raynaud's disease to lead to more than superficial necrosis, though Choyce (*System of Surgery*, Vol. I, p. 209) records a case of gangrene in all four extremities with a sudden onset, which he attributes to Raynaud's disease. There was no evidence of ergotism.

It is difficult to say what the mechanism of the production of gangrene in this case may have been. The hard cord palpable in the left popliteal space suggests that venous thrombosis may have occurred, but the lack of superficial varicosity suggests that there must have been some other factor at work, possibly arterial spasm of the type seen in Raynaud's disease, due in this instance to toxæmia and debility.

TETANUS CURED BY MAGNESIUM SULPHATE

By R. K. BOSE, L.M.S. (Cal.)

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THE patient—a Hindu male child aged 4, admitted on 31st October, 1933, for treatment of an ulcer on his head.

On examination the following signs were observed; these had apparently escaped the notice of his parents. He had difficulty in swallowing, could only partially open his mouth and his eyes were partly closed, the lower extremities were stiff and abdomen rigid; these signs were detected accidentally as the boy was brought here for the cure of the ulcer on his head.

31st October, 1933. Treatment:—One c.cm. magnesium sulphate solution (25 per cent) was injected subcutaneously morning and evening, and chloral hydrate gr. v, potassium bromide gr. v in aqua chloroformi, half an ounce, given twice daily.

3rd November, 1933. From this day 2 c.cm. of magnesium sulphate solution was injected twice daily.

9th November, 1933. The boy had distinctly improved, he could open his mouth widely, eat his food easily, and could walk one or two steps, but still had some stiffness of his legs.

The injections and chloral mixture were continued up to this date. From this time he continued to improve steadily and he was discharged cured four days later.

(Note: It seems doubtful if this degree of spasticity justifies the diagnosis of tetanus. Ep., I. M. G.)

Indian Medical Gazette

JANUARY

FIFTY YEARS AGO

During the last year we have printed, month by month, extracts from the corresponding numbers of this journal of the year 1883. The reading of this old volume, whose leaves after half a century of Bengal's climate are so friable that it is difficult to turn them without tearing them, has both a stimulating and a sobering effect—stimulating, because one sees not only that great strides have been made in the theory of medical science during the last fifty years, but that these theoretical advances have been translated into practical achievements and that the health, in controlled communities at any rate, the Indian and British Armies and the jail populations for example, has undergone a revolutionary change—sobering, because we realize that many of the vistas which then appeared to be opening up have proved to be nothing but mirages, that some of the 'advances' of the intervening years have been made around a circle, so that to-day we find ourselves coming to conclusions already arrived at by our predecessors of fifty years ago, and finally that in a few instances practices that even then were not considered satisfactory have remained unchanged throughout this period.

In 1883 the 'germ theory' of disease was in its early infancy, during the previous year Koch had announced his discovery of the tubercle bacillus, and the discovery of the causative organisms of all diseases was thought by many to be only a matter of time. It had been assumed for some time that typhoid and cholera were both caused by 'germs', that these germs were excreted in the stools of patients, and that they were able to multiply outside the body. Eberth had isolated the causative organism of the former disease three years before, and actually during this year Koch, at the head of a German commission, had come out to study cholera in its home in Bengal, where in the same year he first isolated the vibrio. But in anticipation of these discoveries preventive measures were already being based on the germ theory of the causation of these diseases. There were at this time many sceptics who refused to believe in the germ theory at all, but, as the editor of the *Gazette* at that time pointed out, their scepticism was seldom based on scientific research, more often on intuition and arithmetic; on the other hand there were those who, whilst admitting that germs caused disease, refused to accept the germ theory as the whole truth. In the presence of the rising tide of enthusiasm for this theory the words of these more cautious advisers were at first ignored and

later forgotten, but to-day, when the bacteriological factor is being viewed in its proper perspective and is being considered, not as the only factor, but, with immunity, diet, environment and others as one of the many factors that go to form the epidemiology of the disease, anyone who will take the trouble to look up the old journals and read the criticisms of the more moderate elements in the profession in those days will be struck by the shrewdness and wisdom of some of their observations.

We have mentioned above that Koch came to India during this year to study cholera; earlier in the year a commission was also sent out from France at the suggestion of Pasteur; Dr. Roux, who died only a few months ago, was a member of this commission. This interest of foreign scientists in cholera in India shows that it was fully appreciated even then that India was the home of the disease, and it was evidently thought that the best method of attacking it was to beard it in its lair; this policy was however not a success, as in fifty years the cholera position in Bengal has undergone little change, but other and effective methods have been adopted by foreign countries to prevent the extension of the disease into their territories, so that in Europe to-day cholera is almost unknown.

In the January (1883) number a writer, discussing the recent advances in bacteriology, points out the necessity for an exact knowledge of the nature of the 'microphytes' that cause different zymotic diseases, so that action against them can be specific and not empirical; he goes on to say that, whatever other action is taken, it must be accompanied by the remedying of sanitary shortcomings. The zymotic diseases with which they were most concerned were enteric and cholera; despite our increased knowledge of the nature of the causative organism of these diseases and despite the undoubted success of prophylactic inoculation, it might well be claimed to-day that wherever in the world lasting improvement in the incidence of these diseases has been achieved, this has been brought about mainly by sanitary reform in its most restricted sense. In the next number the views of von Pettenkofer, who was obviously not a whole-hearted supporter of the germ theory, are discussed; he claims that certain local and seasonal conditions are necessary for the effective action of the cholera germ, whether it be an essentially virulent organism or an innocent one that has acquired virulent properties by existence under special conditions. His opinions are particularly interesting in view of the recent epidemiological work on cholera, and of the bacteriophage work of Pasricha and others in which, by the action of bacteriophage, changes in the agglutinability—and possibly in the virulence—of vibrios has been effected.

The discussion in the March number on enteric fever does however demonstrate a very

definite advance in our knowledge since that date. The writer is puzzled by the fact that in England enteric is definitely an epidemic disease, that a community can drink sewage-contaminated water for some time with impunity, and that it is only when a case of enteric is imported that an epidemic occurs, whereas in India the disease appears to arise *de novo*, 'where no personal communication has arisen with anyone suffering from enteric fever, (and) no sanitary defects are discoverable'. To-day we know that an individual may remain a carrier for a long time, that the indigenous inhabitants of India are not immune from the disease but that it is common amongst them, and that the sanitary standards of fifty years ago were not sufficiently high to exclude the possibility of the introduction of infection; with this knowledge the facts that puzzled the writer of 1883 seem to us to be the natural result of existent conditions.

In the April number there is a warning from the surgeon-general in Bengal that an epidemic of cholera was about to take flight from Bengal up to the Gangetic plain; this prophecy proved true, just as those of a similarly highly placed official that have appeared in recent years in this journal have done; and in the October number yet another surgeon-general's description of conditions suggesting partial failure of the monsoon, which he says are those that are likely to lead to a cholera epidemic, is very familiar to the present-day readers of this journal.

The paucity of references to malaria in this volume cannot be taken as an indication that the disease was not an important one, but it was probably due to the fact that malaria was not generally recognized as a zymotic disease, being looked upon as the standard fever of tropical countries about which little could be done except in the way of treatment. The subject had not then received the stimulus that was given to it a few years later when Laveran's discovery became more widely known and its significance appreciated, nor when some fourteen years later Ross made his classical contribution to the science of malariology. However, the subject was not entirely neglected and one gathers from the December number that the theory, revived by a recent director of public health in this province, that the malarious state of many districts in Bengal was brought about by the interference with natural drainage by road and railway embankments, was even in those days an old one, and was considered important enough to be the subject of a commission.

During fifty years the quinine position appears to have undergone very little change. The reports from the government cinchona plantations bear a striking resemblance to those of the present day, except that a greater proportion of cinchona febrifuge was manufactured

then; the price was Rs. 8-8-0 a pound, almost exactly the same as it is to-day. Since this day cinchona febrifuge has gone in and out of fashion more than once. Recent references by the League of Nations Health Organization might lead the uninitiated to imagine that Quinetum, now replaced by a standardized preparation, Totaquina, was of comparatively recent origin, yet in April 1883 it was referred to as 'the well-known cinchona febrifuge'.

In the same number a reference is made to Manson's work on filariasis transmission, which was the forerunner of Ross' malaria work, and to the fact—well recognized then but apparently sometimes forgotten to-day—that the embryo is found in the blood more often in persons without any pathological lesions than in those with elephantiasis.

There are indications in the May number of the birth of the 'rheumatic-fever-in-the-tropics' controversy, which still rages; the writer in this number has a theory that malaria and rheumatic fever are the same diseases, showing different manifestations in tropical and in non-tropical countries. His argument cannot have been very convincing, even in those days, but we are reminded that no revolutionary advance has been made since then in our knowledge regarding the latter disease.

Koch's discovery of the tubercle bacillus gave rise to hopes which were sadly unfulfilled; the writer of the following words must have been bitterly disappointed as the years rolled by and his ideal germicide failed to materialize. 'The germ theory' he wrote, 'being once placed on a stable footing, treatment—preventive and curative—by germicides would become an imperative necessity, and the only questions remaining for solution would be—what are the most effective germicides for particular varieties of pathogenic organisms, and how they can be most effectively applied in the special circumstances of each disease'. He recorded some that had been tried without success in tuberculosis, the failure being due in his opinion to the fact that the bacillus was (most annoyingly) extravascular and therefore uninfluenced by germicides circulating in the blood. He concludes naïvely, 'This subject therefore may also be considered *sub-judice*'. And so it has remained for fifty years!

The discovery of the leprosy bacillus preceded that of the tubercle bacillus by three or four years; it is amusing to read in the December number that a Swedish doctor had succeeded in infecting animals with leprosy. Few years have passed since this date without a similar success being reported, but leprologists of the present day are loath to admit that experimental infection has ever really been produced.

A link with the present is provided in an article by Arthur Neve of the Mission Hospital, Kashmir, who is, we believe, the brother of Dr. E. F. Neve who is still in charge of this

well-known hospital. Neve writes on the subject of radical cure of hernia; he refers to many of the methods then in vogue as 'barbarous' and advocates Spanton's method; this consists in obliterating the inguinal canal by means of a screw which gives rise to an inflammatory reaction followed by cicatrization. One wonders what the other *really* barbarous method must have been like! In justice to the times, it is only fair to say that this writer does not escape criticism; a polemic discussion followed in which Dr. Neve neatly turned the tables on his opponents by admitting that they had the advantage over him in that they were so often able to demonstrate the results of their operations in the post-mortem room. Other surgical references are to lithotomy and lithotrity, so that it is evident that the controversy regarding the respective merits of these two operations—which from time to time breaks out in these pages even now—had already begun.

In the July issue there is a reference to Gower's hæmoglobinometer; that a few months ago this instrument—possibly not the identical

one, but a contemporary one, we should gather from the faded condition of the standard—was supplied from a scientific institution to an officer who proposed to carry out some work on anaemia, suggests that in the intervening years little advance has been made in India at any rate in hæmatological technique. But on the other hand the instructions that to obtain the average size of the red blood corpuscles *ten* cells should be measured does make one realize that the research workers of the present day have a greater respect for mathematical principles.

We do not think that in reviewing this fifty-year old volume of the *Gazette* we can possibly be accused of jeering at our predecessors, and for the sake of any of our colleagues who may think that we are minimizing the importance of recent scientific contributions we will quote from Bernard Shaw's *Doctor's Dilemma*:

'Don't misunderstand me, my boy. I am not belittling your discovery. Most discoveries are made regularly every fifteen years; it is fully a hundred and fifty since yours was made last'.

Special Article

FRACTURE EQUIPMENT: WITH NOTES ON ITS USE

By H. R. RISHWORTH, F.R.C.S. (Eng.)

District Medical Officer, G. I. P. Railway, Byculla, and Hon'y. Visiting Surgeon, St. George's Hospital, Bombay

Part I

STANDARD EQUIPMENT

FROM an administrative point of view, standardization of fracture equipment is a useful procedure. The matter is less simple however than it appears at first sight. Surgeons differ in their beliefs and come from different schools of teaching. For the average man there always will remain a bias in favour of the methods learned at his medical school, but equally good results appear to follow different procedures with dissimilar apparatus. It should be understood, therefore, that the standard scale given below is not intended as an attempt to codify fracture procedure, nor even to dictate special lines of treatment on the subject in railway hospitals, but as a suggestion, to remedy the deficient scale of equipment now laid down as standard on many railways in India, and to make essential and less easily-improvised apparatus available in all dispensaries and district hospitals. With the exception of the selection of items in the scale, and the care given to arrive at standard dimensional requirements and specifications, no claim is made to originality.

Attempts have been made and are still being made throughout the world by committees to

arrive at standardized apparatus and standardized or approved procedures for treatment. The Fracture Committee formed of members of the staff of St. Thomas' Hospital may be cited as an example of such a committee working for an institution. In America an elaborate organization, known as the 'Committee on the Treatment of Fractures' with Charles S. Seudder of Boston as chairman, has been in existence for some years. This committee is sponsored by the American College of Surgeons. Many regional sub-committees work under, or co-operate with, the main committee. The American Medical Association has an Exhibit Sub-Committee engaged in propaganda work, and demonstrations on the treatment of fractures and the correct use of approved apparatus. The A. M. A. issued in 1930 an *Illustrated Primer on Fractures* which suggests what constitutes acceptable treatment, with illustrations of the apparatus recommended. The American Railway Association, which includes among its members 250 chief surgeons and 14,000 other surgeons in the U. S. A.—presumably railway surgeons—has Permanent Regional Fracture Committees, co-operating with the college committee to secure better treatment of fracture cases resulting from railway accidents and in railway shops. No such colossal and massed attack on the question has been attempted elsewhere.

Another attempt at standardization of fracture treatment, of a different order, is the system evolved by Professor Lorenz Bohler, head of the

Arbeiter-unfallspital of Vienna. At this institution the precise procedure and apparatus is carefully systematized for each lesion. It is a pleasure and a revelation to watch the team work organized by him in operation. The circumstances however are favourable to such an organization at Vienna, where all injured workmen are concentrated at this one accident hospital under one director. Many of the methods advocated by this teacher are original and are gaining world-wide acceptance. I am indebted to his teaching for some of the apparatus here recommended.

A valuable and earlier attempt at standardization may be found described in the *Manual of Splints and Appliances* issued by the British Red Cross Society in 1917. I strongly commend this manual to the notice of all medical officers who expect to treat fractures on modern lines with modern equipment. Details in regard to measurements and specifications of some of the splints described in this note have been obtained from this useful little book.

It will be seen that many attempts to achieve standardization are being made, but it is obvious that each organization must compile a scale to meet its peculiar needs. If this scale however is to satisfy the general worker and at the same time stand up to well-informed criticism, it must be based on broad principles of treatment which are more or less generally accepted as embodying modern views. These principles I believe to-day are

1. The use of Thomas' splint or one of its modifications, e.g., Jones', Murray's, Sinclair's, for both extremities, involving the skeleton type of splinting and the sling principle of support.

2. The use of a Balkan beam or some suitable substitute.

3. The application of direct extension to bone by calipers, ice tongs, wire, needles and stirrup, etc.

4. The increasing use of plaster of Paris as a splinting medium.

5. The abduction position for lesions of long bones situated near the shoulder or pelvic girdles.

6. Ambulatory methods where possible.

7. The passing out of general use of the flat board type of splint, e.g., Dupuytren's, Liston's, except for first aid and transport purposes.

8. The use of powerful screw traction apparatus or extension appliance in reducing or 'setting' difficult fractures, and for maintaining the limb in extension during the application of plaster or other means of fixation.

9. Greater conservatism in regard to open operation with more clearly-defined indications for its application.

10. The imperative use of radiography in diagnosis, treatment, and the assessment of results.

11. The use of local analgesia for obtaining relaxation and of course for the relief of pain.

I do not think it is possible to lay down a standard on modern lines without attention to all of these.

Turning now to the scale which is given in tabular form on page 35, it will be seen that it consists of four allotments:

- (1) Loan equipment.
- (2) Equipment for A-grade district hospitals.
- (3) Equipment for B-grade district hospitals.
- (4) Equipment for dispensaries.

The loan equipment is maintained in Bombay*. The items are available for any hospital on the line within 24 hours, on application by wire, and consist of apparatus or instruments which are not required for immediate use on the admission of a patient.

In classifying district hospitals into A and B grades the factors taken into consideration are the possession of an x-ray plant and the number of beds. In the nature of things it is unlikely that a uniform standard of surgical skill will ever be found among district medical officers. The larger districts appear to attract those with a penchant for surgical work and it appears sound policy to allot to such districts a fuller equipment than to the others. Byculla, Jhansi and Bhusaval* are for these reasons classed as A-grade hospitals. In order, however, that the limitations of a standard scale should not tend to restrict the ideas of any medical officer wherever posted, it is proposed that a standing work-order be placed with the local works at district headquarters to supply any special type of splint outside the standard scale. No modification or alteration of the actual standard items in stock should be permitted without reviewing the standard for all districts. Such modifications if permitted will inevitably result in difficulties with the ledger and possible ultimate loss or irreparable difficulty in checking equipment. It will be main up to date. The items are

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Thomas' splint and modifications for arm.



Fig. 1.—Abduction arm splint with fixed rods.



Fig. 2.—Arm splint with swivelled rods. Murray's model.

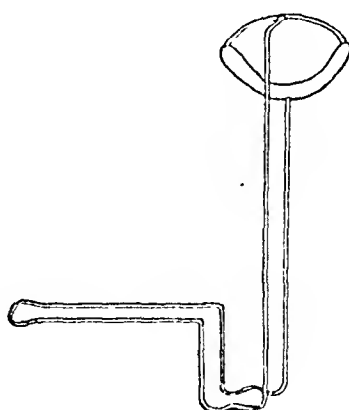


Fig. 3.—Jones' traction humerus splint.

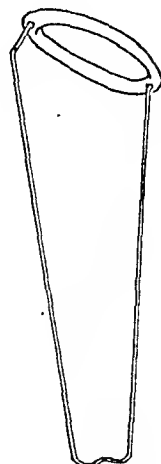


Fig. 4.—Thomas' splint.

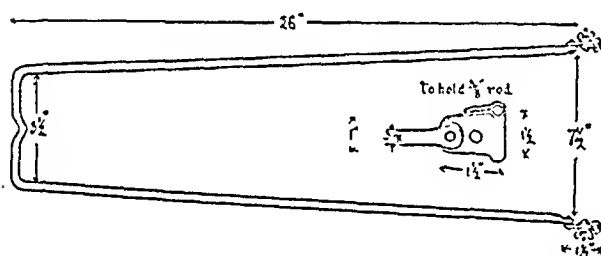
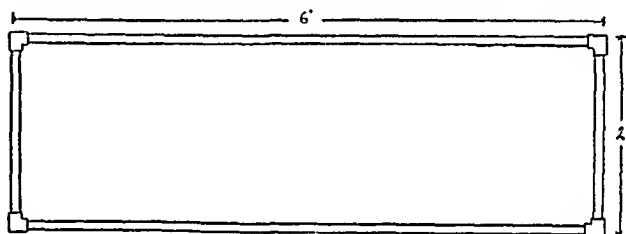


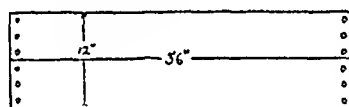
Fig. 5.—Sindair's knee piece. For use with Thomas' splint.

Fig. 6.—Bradford frame. For transport and treatment of spine and pelvic injuries.



Canvas slings.

Fig. 6a.



Eight such required.

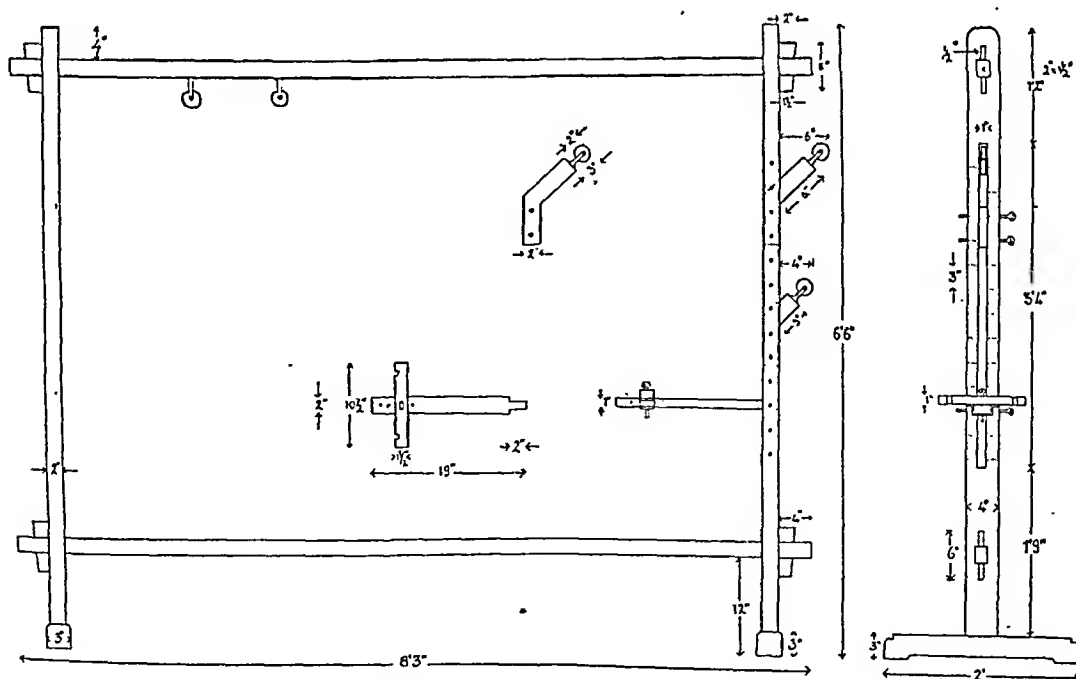


Fig. 7.—Suspension beam or Balkan frame (after Bohler).

Equipment for doctor's car as recommended by the A. M. A.:

Thomas' leg splint	..	..	1
Thomas' arm splint	..	..	1
Wood splints, flat	..	..	1 set
Sheet of wadding or wool			
Tourniquet	..	..	1
Can of ether	..	..	1
Bandages and adhesive tape			

The above list takes no account of means for the transport of spinal and pelvic injuries, and I do not consider that either 'Thomas' splint or flat boards are adequate for the comfortable transport, at any rate in railway trains, of low fractures in the leg, as for instance a Pott's fracture. The point of application of traction, to secure effective extension, is too near the point of injury to permit the use of a Thomas' splint. On the other hand the medical subordinate may find it impossible to reduce the fracture well enough, without assistance, to enable flat board splints to be used effectively. For these cases I have included in dispensary equipment a specimen of the well-known Edinburgh box splint. If the limb is well packed around with wool before the sides are brought together this splint will keep a Pott's, or other low fracture in the leg, in comfort and without risk of further displacement or damage to the soft parts during a railway journey. I doubt if there is a simpler and better first-aid appliance for low fractures of the leg than this cheap and easily-made contrivance. Medical officers should however resist the temptation to use this splint for the permanent treatment of these fractures, especially where there is displacement which tends to return after reduction. Considerable deformity and shortening will result owing to the absence of arrangements for securing extension. Such cases are better dealt with on a Braun's splint with extension direct from the bone or by adhesive strapping from the skin; see figures 14 and 15. For spinal and pelvic injuries the scale includes a Bradford frame. A further note on the use of this appliance will be found below.

Fractures of the spine and pelvis have a peculiar distinction when regarded from the point of view of transport and nursing. They may bring the patient to within a narrow margin of death, and that narrow margin can be easily crossed in unskilful attempts to move him. The simplest and safest known way to move such a patient is by means of a Bradford frame. The patient should never be lifted or carried on to a cot or stretcher. A Bradford frame should be placed on him and the body secured to the frame by canvas strips. The strips are passed under the body with the least possible disturbance and securely laced to the side rods of the frame. Additional fixation of the body can be secured by sand-bags and strips passed over the pelvic and shoulder girdles. The patient can then be lifted in the frame

without undue disturbance. If the frame is arranged so as to keep the feet low, spinal extension can be secured by a chin-and-occiput bandage carried to the top cross bar. Nursing can be carried out in the same frame without any or scarcely any movement, one strip of canvas being removed at a time as occasion arises. The frame and canvas are shown in figures 6 and 6a. Six strips fill the frame and two extra ones are provided for fixation of the pelvic and shoulder girdles during transport.

No special apparatus is provided for fractures of the bones of the hand and foot. It cannot be the purpose of a standard scale to provide in detail for every contingency. The treatment of these fractures however lends itself to improvised apparatus as it requires small and easily-made appliances. The surgeon will find in the scale means to this end in the shape of plaster, tools, and Cramer's wire splinting. Some suggestions in the use of the last item will be found illustrated in figures 18 to 20.

In regard to the humerus, in addition to the straight swivel arm splint and the Jones' extension splint, abduction for high fractures has been provided for by an acroplane splint (figs. 16 and 17). This splint does less than justice to itself so far as appearances go. It is, however, light, comfortable, easy to manufacture, and can be worn continuously for long periods. Children and undersized, outsized, or deformed individuals can be fitted with improvised abduction splints made from Cramer's splinting as shown in figure 18.

A built-up fracture bed with sectional mattress and pulleys is a great convenience to the nursing staff. Except for A-grade hospitals, however, I do not think a general issue is necessary. For these three hospitals I recommend the issue of one Pearson fracture bed to each. It is superior to Souttar's beam (London Hospital), and is stronger and less complicated than Morrison's frame in use at Edinburgh.

For B-grade hospitals the ordinary bedstead (Lawson-Tait) with fracture boards and a suitable Balkan beam is satisfactory for the occasional use it will be put to. Full details for making fracture boards, standard pattern weights, bed steps and a thoroughly satisfactory type of Balkan beam will be found in figures 7, 8, 9 and 10. The beam is a take-down model for convenience of storage when not in use, adapted from the design in use at the accident hospital, Vienna.

No mention has been made of the rarer forms of fracture, which present special difficulties, such for instance as fracture of the os calcis. This scale is intended as a minimum essential to meet the requirements of the average medical officer. On the other hand I believe it may be argued that the proposed scale is actually excessive, and that some of it may probably never be used. The answer to this is simple. The probability becomes a certainty if the equipment

Fracture bed accessories. Suggested standard patterns.

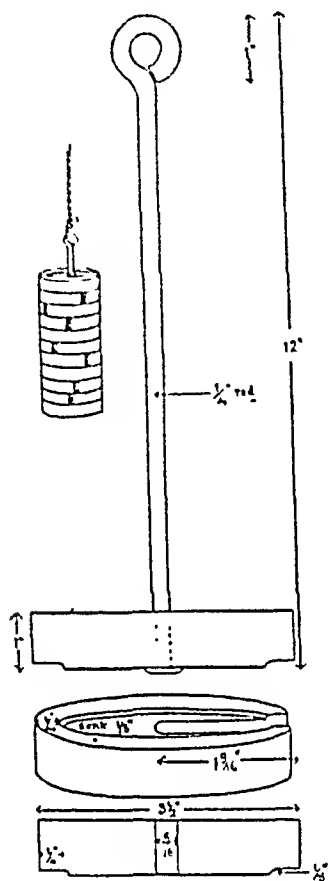


Fig. 8.—Standard pattern metal weights for extension.

Fracture bed accessories. Suggested standard patterns.

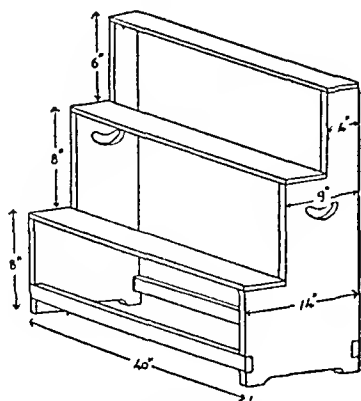


Fig. 9.—Bed steps for raising foot of bed for counter-extension.

Fracture bed accessories. Suggested standard patterns.

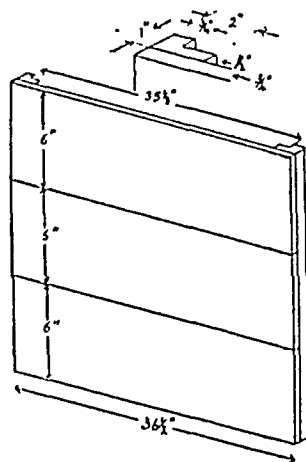


Fig. 10.—Fracture bed boards. Three such boards required for each bed. Designed for Lawson-Tait bedsteads with frames 72 inches by 35 inches.

Edinburgh box splint. (For issue to dispensaries only.)

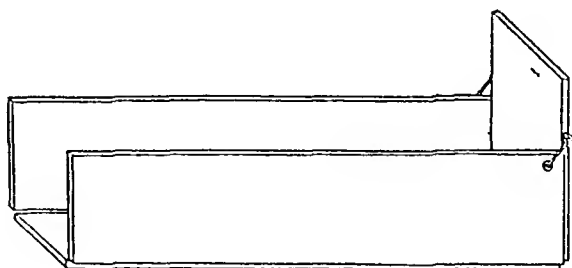


Fig. 11: Closed.

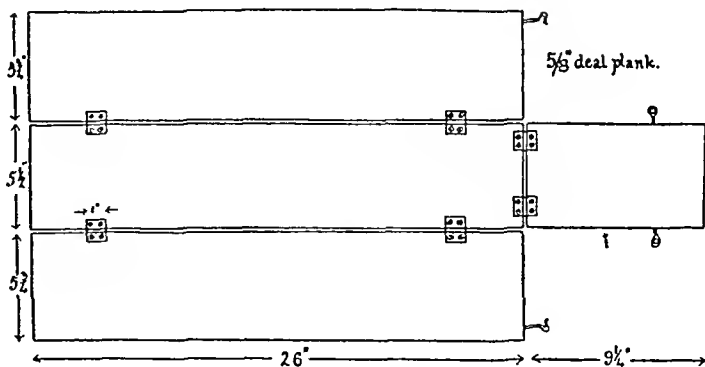


Fig. 11a: Open.

Figs. 11 and 11a.—For temporary treatment and transport of closed or open fractures below the middle of the leg. Not to be used for permanent treatment.

is not supplied, and this, I think, is to some extent the condition of things to-day. Fracture treatment has made great strides since the war, and unless suitable modern appliances are shown to be available, it will be difficult to meet instructed legal criticism or well-informed lay comment.

Some of the minor items of equipment such as tools, weights, sand-bags, steps for raising beds, may appear unnecessary to a certain type of mind. No need, however, is so important in fracture treatment as careful attention to detail. These minor items are really essential if annoying delays and difficulties are not to be encountered.

As far as possible each appliance recommended is described and illustrated by detailed drawings with accurate measurements. The drawings have been so contrived that the items can be easily made from them under a competent foreman*. Where it is intended, on account of the nature of the material or its construction, that an item should be purchased, the maker and the catalogue number have been given so as to ensure a good article with at the same time uniformity in design.

I have not considered it necessary to fortify this report with accurate references to literature. This is partly due to the difficulties of access to journals in a mofussil town, and partly because I believe that a scale of wide application should be based on material which has achieved sedimentation into recognized textbooks on the subject. The following publications are useful and have been referred to freely in the preparation of this note :

Injuries and Diseases of Bone. By Sir W. J. DeC. Wheeler. 1928. Baillière, Tindall and Cox, London.

Illustrated Primer on Fractures. Second Edition. 1931. Prepared by the Co-operative Committee on Fractures. American Medical Association, Chicago.

Manual of Splints and Appliances. By the British Red Cross Society. 1917. Henry Frowde Hodder and Stoughton, London.

Traumatotherapy. By John J. Moorhead. 1931. W. B. Saunders Co., Ltd., Philadelphia and London.

Treatment of Fractures. By L. Bohler. Translated by M. E. Steinberg. 1930. William Maudrich, Vienna.

The Practitioner. (Special Fracture Number.) July, 1931.

Thomas' Splint. By M. Sinclair. Oxford University Press, London.

Acknowledgment

My thanks are due to Dr. S. C. Chatterjee, M.D., M.R.C.P. & D.P.H., Acting Principal Medical and Health Officer, G. I. P. Railway, for permission to publish this paper.

* It is suggested that blue prints of the diagrams be prepared and retained as standards so that the equipment can be produced at the railway works. If this is not possible for any reason, the work can be done on contract, according to the specifications given, by any one of the numerous competent surgical firms now producing quite good apparatus in India. I believe however that the former procedure, after perhaps "a little trouble," will be found an economical method, both at first issue and for subsequent replacements.

Appendices

SPECIFICATIONS AND CONSTRUCTIONAL NOTES

Thomas' leg splint.—For transport and treatment of injuries to the hip, femur, knee and leg. A padded ring attached to two rods bent in a U shape, made of $\frac{3}{8}$ inch iron. The rods are continuous at the end opposite to the ring, by a notched cross piece which keeps them $3\frac{1}{2}$ inches apart at that end. The rings uniting the upper ends of the rod are of three sizes, $11\frac{1}{2}$, $10\frac{1}{2}$, and $9\frac{1}{2}$ inches in diameter. These measurements are exclusive of the padding. The special large outside of $11\frac{1}{2}$ inches is maintained on the loan equipment. The plane of the ring is set at an angle of 55 degrees with the main direction of the outer rod. The padding should be twice as thick on the inner or short rod side than on the outer. The maximum diameter of the padding is $1\frac{1}{2}$ inches. The padding consists of soft tow covered with smooth leather. Hospital staff should see that the leather is occasionally treated with soap to keep it resilient. The inner rod is 42 inches and the outer 47 inches in length, $2\frac{1}{2}$ inches from the upper end, the outer rod is bent inwards at an angle of 145 degrees so that it may meet the ring at a right angle. The rods are therefore much wider apart at their upper ends than their lower. The rods may be bent at the knee or varied slightly in shape with the use of the bending tool (figure 21). The stitching of the leather covering for the pad should be on the under side of the ring, that is on the same side as that on which the rods are attached. The diameter of the rings should be carefully noted as the rings supplied with the breakdown equipment are too small. It is better to have large rings than rings which may prove to be too small (figure 4).

Thomas' arm splint.—A circular padded ring $7\frac{1}{2}$ inches in diameter with two rods 34 inches in length attached at right angles to the plane of the ring. The ring and rods are of $\frac{1}{2}$ inch iron. At their attachment to the ring the rods are $7\frac{1}{2}$ inches apart and at the other end they are continuous by a notched cross piece which holds them $2\frac{1}{2}$ inches apart. The padding on the ring consists of soft tow covered with soft leather, and is of a uniform diameter of $1\frac{1}{2}$ inches. The stitching of the leather should be on the same side of the ring as the rods. This splint is unsuitable for the transport of arm injuries, as the limb must be carried in the abducted position if extension, which is obtained by pressure of the ring against the thorax, is to function properly. For purposes of transport the swivel arm splint about to be described is preferable (figure 1).

Thomas-Murray swivel arm splint.—Also known as Jones' or Sinclair's modification. The ring padding and rods are similar to the last splint. The rods however at a distance of $1\frac{1}{2}$ inches from their attachment to the ring are flattened and hinged by a loose rivet. This permits the rods to be moved in a plane at right angles to the plane in which they lie. This hinged movement allows the arm to be brought to the side for purposes of transport. Extension is then obtained by counter-pressure in the axilla. For this reason this splint is unsuitable for injuries near the shoulder joint. Such injuries, for first-aid purposes, are best bandaged to the side in a sling. The swivel should on no account be made directly on to the sides of the ring. The hinge is likely to hurt the patient if this is done and the line of the rods does not lie in the axis of the limb. This mistake has been made by the firm of surgical instrument makers who have supplied swivel arm splints for the breakdown equipment (figure 2).

Jones' upper arm traction splint.—A wire ring $7\frac{1}{2}$ inches in diameter is bent across its centre. The lower half circle is padded with tow and leather the centre of the padding being thicker than the ends by a gradual transition. The maximum thickness of the padding to be $1\frac{1}{2}$ inches. The upper half of the circle is unpadded and is so bent that when the padded part is in the arm-pit or axilla the upper part arches well over the shoulder. The wire rods are attached to the

Standard scale of fracture equipment

Serial number	Name of article	Loan equipment	DISTRICT HOSPITALS		Dispensaries	REMARKS
			A grade	B grade		
1	X-ray equipment .. ..	..	1	..	..
2	Pearson's fracture bed .. ..	..	1	..	..	Malgham Bros.
3	Fracture boards, S. P. set of 3 .. ..	..	1	1	..	Fig. 10.
4	Weights, S. P. sets .. ..	..	2	2	..	Fig. 8.
5	Steps. Bed-raiser .. ..	..	1	1	..	Fig. 9.
6	Bone-plating sets, Lane's	1	..	..	..
7	Steinmann's stirrup and pins	1	1	..	..	Allen & Hanbury, No. 4072.
8	Traction calipers, Pearson's	1	1	..	..	Allen & Hanbury, No. 4077.†
9	Walking calipers, S. P.	2	..	..	..	Rings 9 ins., 10 ins. diam.†
10	Walking stirrup irons, S. P. .. ..	..	6	6	..	Local Work-order.†
11	Plaster of Paris, 1 lb. tins .. ..	..	..	..	..	*
12	Storage box, for above, S. P. .. ..	..	1	1	..	
13	Leg splints, Thomas', S. P.	2	2	2	2	Fig. 4.
14	Arm splints, Thomas-Murray, S. P. .. ..	..	1	1	1	Fig. 2.
15	Arm splint, Jones' traction, S. P. .. ..	..	1	1	..	Fig. 3.
16	Arm splints, aeroplane, S. P. .. ..	..	2	2	..	Right and Left. Figs. 16 and 17.
17	Braun's splint, adjustable, S. P. .. ..	..	1	1	..	Figs. 12 to 15.
18	Böhler's webbing loop, S. P. .. ..	..	1	1	..	†
19	Perineal pillar and sacral support .. ..	..	1	1	..	†
20	Screw traction rods, for above .. ..	..	1	..	..	With head and shoulder rests.†
21	Knee flexion piece, Sinclair's .. ..	..	1	1	..	Fig. 5.
22	Bradford frame, S. P. .. ..	..	1	1	1	Fig. 6.
23	Canvas strips, for above S. P. .. ..	..	1	1	1	Fig. 6a.
24	Cramer's wire splints, S. P. .. ..	..	12	12	..	Figs. 18 to 20.
25	Board splints, flat, sets of 6 .. ..	..	..	..	1	24 ins. by 4 ins. by $\frac{1}{2}$ in.
26	Edinburgh box splint, S. P. .. ..	..	..	..	1	Figs. 11 and 11a.
27	Bending tools, steel, S. P. .. ..	..	2	2	..	Fig. 21.
28	Saws, hand, common, 12 inches .. ..	..	1	1	..	
29	Saws, plaster, Bergman's .. ..	..	1	1	..	Surg. Mfg. Co., No. B3859.
30	Pliers, cutting, 7 inches .. ..	..	1	1	..	
31	Shears, plaster, Stille's, 14½ inches .. ..	..	1	1	..	Surg. Mfg. Co., No. 3852.
32	Sand-bags, 18 inches by 6 inches, S. P. .. ..	..	6	6	..	
33	Adhesive plaster, reels, 2 inches .. ..	..	..	..	..	*
34	Log line or whip cord, $\frac{1}{4}$ inch .. ..	..	..	..	..	* (A. & N. Co-op. Stores).
35	Mull mull, or crinoline gauze	32	..	..	..	*
36	Crutches, French pattern, adjustable, pairs .. ..	..	2	2	..	Surg. Mfg. Co., No. 4162.

* These are expendable articles and normal requirements of hospitals and dispensaries; they will be estimated according to expenditure.

† Reference will be made to these in a subsequent paper.

S. P. = Standard pattern.

centre of each half circle. The inner rod is 14 inches long in its first or vertical part. It passes vertically down from the centre of the padded half circle. The outer one is 18 inches long in its first part, and is so curved at its origin from the circle as to follow the profile of the shoulder and then to descend vertically parallel to but $4\frac{1}{2}$ inches from the inner rod. Both rods return to form a loop 4 inches and 3 inches wide with an indentation at their lower ends. They are then carried forward at right angles to the vertical for a distance of 12 inches being then continuous by a notched cross piece at the end. This notched cross piece keeps them $4\frac{1}{2}$ inches apart (figure 3).

Sinclair's knee flexion attachment.—This apparatus is necessary where direct extension is made from the knee with the limb in a Thomas' splint. It allows flexion at the knee without interference with the

extension (see figure 5). The rods are made of $\frac{3}{8}$ inch iron and are bent to a U shape each limb of the U being 26 inches long. They are 5 inches apart at the lower end where the rods are continuous by means of a notched cross bar, and 7 inches apart at the upper end of each rod. At each upper end of the rods a clamp is provided with a butterfly nut by means of which the appliance can be attached at any point along the side rods of a Thomas' splint. The junctions between the clamp and the rods of the flexion attachment act as hinges by means of loose rivets. The detailed construction of this clamp is to be found in the diagram referred to above.

Note.—All the splints hitherto described should if possible be finished by oxidizing the metal parts. If this is found to be too expensive they may be finished with black Japan, but the former offers a more durable

Fig. 12.

Braun's splint. (a) Side. (b) Plan. (c) Front.

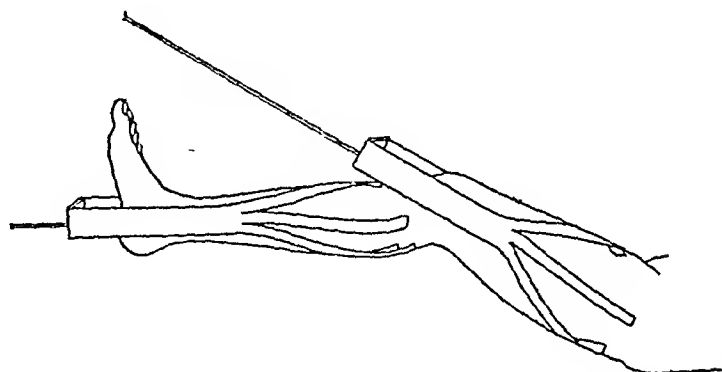
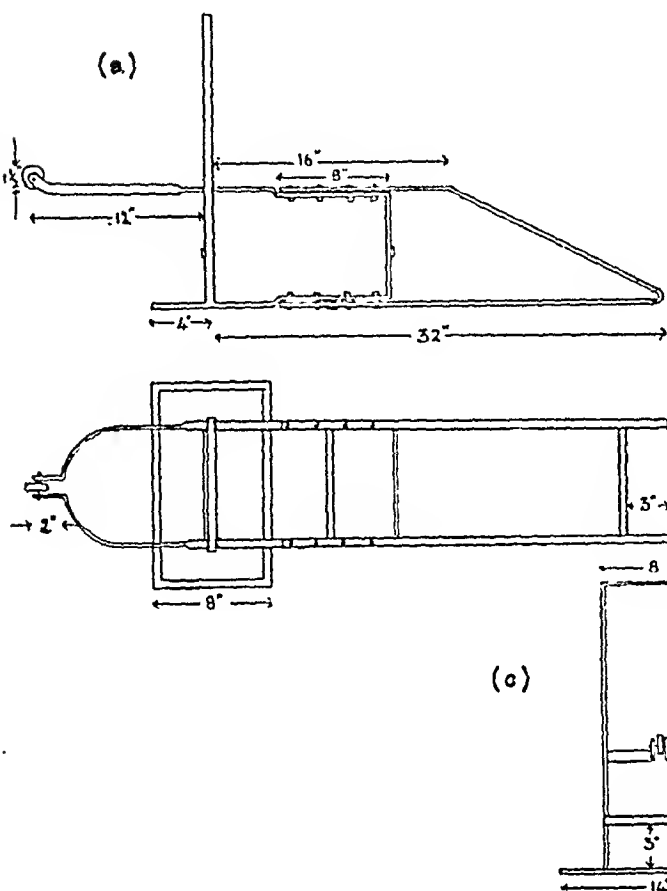


Fig. 13.—Method of applying adhesive traction from thigh and leg in fractures of the femur with Braun's splint as support.

Braun's splint as used for direct traction.

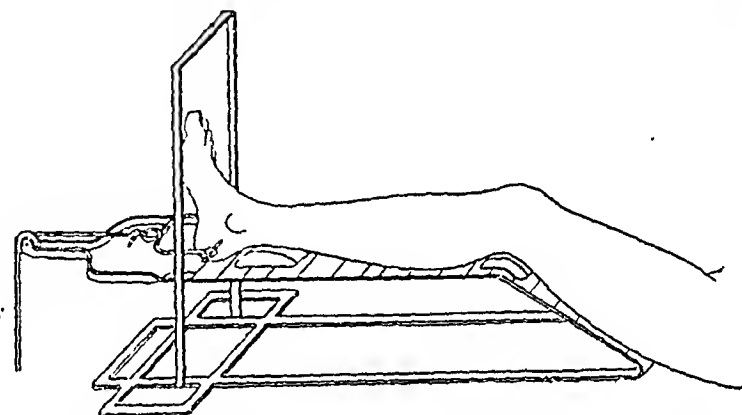


Fig. 14 shows intrinsic traction from the os calcis. Pads under the knee and tendo Achilles used if necessary.

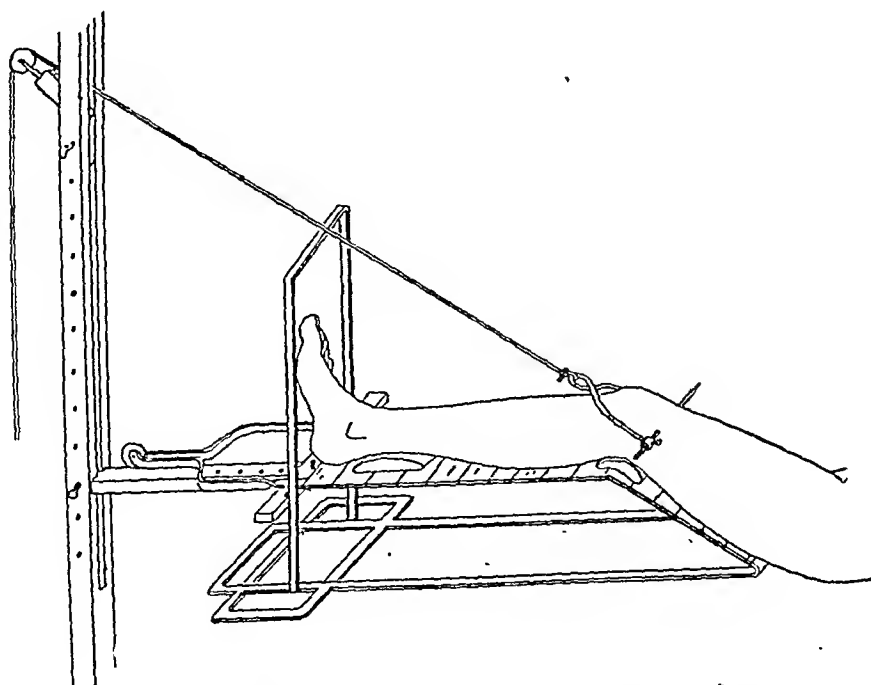


Fig. 15 shows extrinsic traction with a Balkan beam for the lower end of the femur. Counter-extension is provided by raising the bed and the splint kept from slipping down by the T-shaped adjustable device.

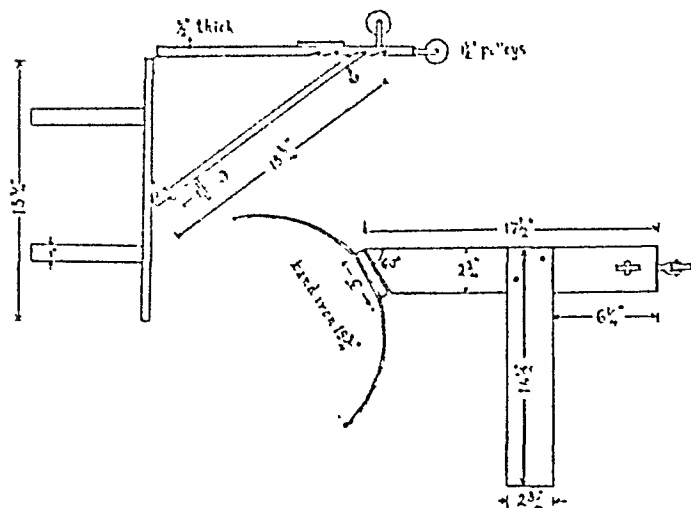


Fig. 16.—Acroplane or abduction splint for arm. Right and left splints different. Constructed of $\frac{1}{2}$ inch deal, and 1 inch band iron.

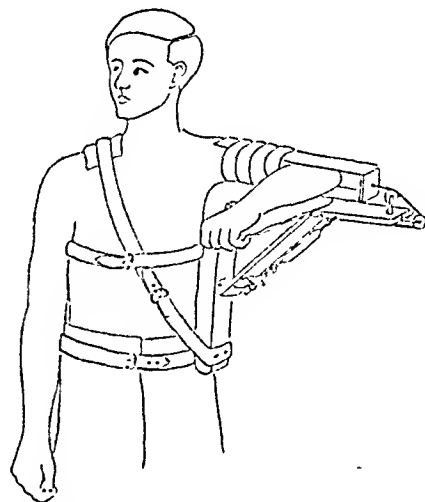


Fig. 17.—Band iron to be covered with leather and extended as web straps with buckles. Extension provided by means of small Salter's balance with adjusting nut on L piece.

Cramer's, Cabot's or wire ladder splinting. Suggestions for use.

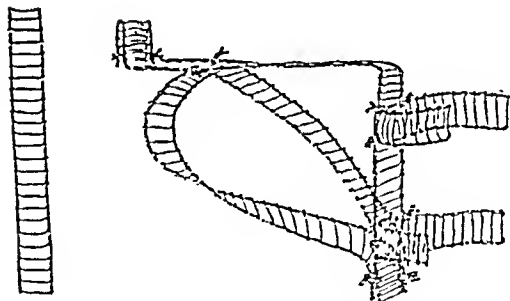


Fig. 18a.—Standard piece of ladder splinting 30 inches long by $3\frac{1}{2}$ inches wide.

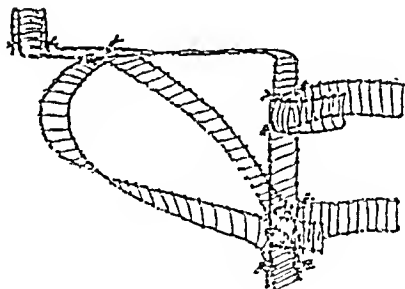


Fig. 18.—Abduction splint for the arm for undersized cases, children, or deformed patients.

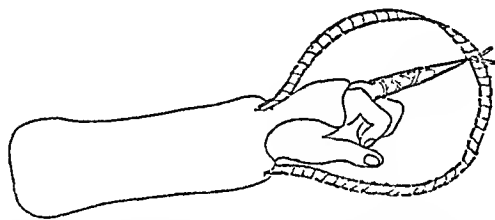


Fig. 19.—Extension bow incorporated in plaster for injuries of bones of the hand. Pulp extension may be used with Bohler's finger splints.

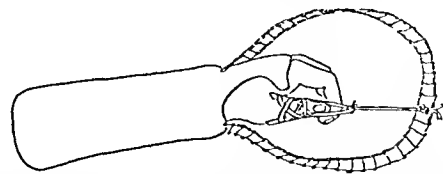


Fig. 20.—Extension for thumb. Similar devices may be used for the foot. This material is also useful for cock-up splints for the wrist.

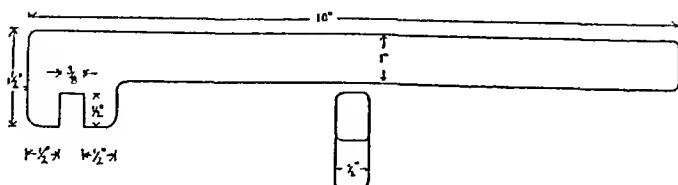


Fig. 21.—Steel bending tool for rods and bars of all splints used in this scale.

and rust-proof finish than the latter. There is of course no comparison in regard to appearance. The oxidized finish is superior.

Wire ladder-splints, also known as Cramer's wire splinting, or Cabot's wire splinting. Diagrams illustrating some of the uses to which this material may be put will be found in figures 18, 19 and 20. Other uses are:

- (1) As flat or moulded splints.
- (2) Bows for extension in hand or foot fractures.
- (3) Cock-up splints for wrist and foot drop.
- (4) Protective cages or cradles with Thomas' or Braun's splint for wounds in open fractures.
- (5) Reinforcement strips in large plasters where additional protection against cracking is required.
- (6) Abduction splints for the arm in the case of children, undersized or deformed individuals.
- (7) Double inclined planes for the lower limb for temporary splinting.

The splint is made of $\frac{1}{2}$ inch galvanized iron wire placed in parallel rows $3\frac{1}{2}$ inches apart. Cross wires of $\frac{1}{4}$ inch diameter connect these two parallel pieces in ladder form, the cross pieces being $\frac{3}{4}$ inch apart. It is not likely that our works will be able to make this splinting material. It can be had, of foreign manufacture, at no great expense. The standard size should be pieces of 30 inches by $3\frac{1}{2}$ inches. They should be ordered under the name of Cramer's wire splints from Germany. Any dealer in surgical goods will be willing to import them. They are lighter, more resilient and adjustable than wooden splints.

Balkan beam.—To be constructed of teak, deodar, good pine or other suitable light but strong wood. Measurements and the details of construction are shown in figure 7. Little further comment is needed. The wood should be varnished or polished. The angled pieces carrying the pulleys may be strengthened by means of iron cheek plates $\frac{1}{4}$ inch thick. The pulley wheels are 2 inches in diameter. They are plain iron punkah wheels. Two spare pulleys are screwed in suitable positions on the cross beam, for suspension purposes. The dimensions of the frame are designed to suit the standard pattern Lawson-Tait bedstead.

Standard pattern weights.—Uniform pattern weights, besides being convenient, add considerably to the tidiness of the ward. The discs of the design shown in figure 8 should be made of cast or turned iron and about 21 pounds in weight.

Acroplane splint.—(Figures 16 and 17.) Extension is obtained by means of a small 25-pound Salter's balance. The cost of a German article is 12 annas. The L piece with adjusting nut at the lower end of the supporting strut permits of alterations in the tension of the spring after the cord has been tied with moderate tension. The wooden parts of the splint are well padded before use. The iron bands are covered with soft leather and prolonged in the form of webbing straps with buckles. The horizontal straps are 44 inches long including the iron part, and the oblique strap which is fixed to the lower end of the vertical piece by tacks is 50 inches long. The iron bands should be well padded before applying the splint.

Bed raiser steps.—Made of deal or teak. Requires no comment (figure 9).

Bending tool of steel.—Oxidized finish. The jaws are shown in figure 21 as $\frac{3}{8}$ inch apart. They should however just take the $\frac{3}{8}$ inch rods of the Thomas' leg splint.

Braun's splint.—Made of iron strips, $\frac{1}{2}$ inch by $\frac{1}{8}$ inch. Dimensions and design given in figures 12, 13, 14 and 15.

Bradford frame.—Of 1 inch galvanized iron pipe or conduit tubing as used in the electrical department for cables (see figure 6). The canvas strips have six brass eyelets of tough quality at each end. They should be large enough to allow a $\frac{1}{2}$ inch cord to run easily through the holes. The ends and sides of the canvas should be selvaged or hemmed.

Edinburgh box splint.—This appliance should be made of $\frac{1}{2}$ to $\frac{5}{8}$ inch deal (see figures 11 and 11a for details). The sides should be held together by two straps or bandages after the limb has been securely packed into the box with wool. Care should be taken to see that the heel and malleoli are well protected and that the hollow below the calf is well supported by abundant wool padding.

Storage box for plaster bandages.—This is more than a convenience. Bandages must be at hand ready rolled and they should be stored in a reasonably damp-proof box. This should be of japanned tin with a well-fitting hinged lid. It should be 12 inches long, 8 inches wide and 8 inches high.

Sand-bags.—These should be made of stout bed ticking and of the following standard dimensions. 18 inches long by 6 inches wide. Those supplied for use on the breakdown train are too long and clumsy. Two bags of moderate length are better than one long one. The bags are issued empty and hospitals should be instructed to see that they are not filled to capacity. The bag should be stood on end when nearly full and the sand well shaken down to leave a space of 3 finger-breadths, before being closed by stitching. If this is done they will be found less liable to leak or burst and will better adapt themselves to the contour of the limb.

Flat board splinting.—These should be available in bundles of six. Each piece to be of plain deal $\frac{1}{2}$ inch thick, 24 inches long and 4 inches wide. They are essentially first-aid appliances and all dispensaries should keep a supply. A small saw is included in dispensary equipment for cutting them into suitable sizes. Small pieces are useful for stirrups in plaster extension.

Fracture boards.—Details of these boards will be found in figure 10. The figure requires no explanation. Three boards constitute a set. The dimensions will fit the standard hospital Lawson-Tait bed with a frame of 72 inches by 35 inches. Fractures which require confinement to bed cannot be treated on a spring mattress unless a rigid structure of this sort is interposed between the springs and bedding.

Adhesive plaster.—Many varieties reach us mostly of bad quality from the medical stores. The most effective brand in my experience is that manufactured by the Seamless Rubber Co., Newhaven, Conn, U. S. A., and supplied in convenient containers on reels. The standard width should be 2 inches. If wider sizes are supplied wastage occurs. The 2-inch size, if overlapped 1 inch, provides effective straps 3 inches wide for all extension purposes. The stirrups for extension should be cut from the standard pattern flat board strips. They must in all cases be sufficiently wide to leave a clearance of $\frac{1}{4}$ inch between the malleoli, or condyles and the plaster.

Pearson's fracture bed.—(It can be obtained from Messrs. Malgham Brothers, Bank Street, Fort, Bombay; the complete equipment costs Rs. 285, including mattress.)

It consists of the following:—

Bed with transverse slings; removable lifting pole at head for patient's hands; two cranked uprights at foot; Balkan bar; one short transverse bar; three Maddox blocks; six small pulley blocks with hooks; bed-pan support; and three-piece mattress.

Medical News

THE FOURTEENTH INTERNATIONAL CONGRESS OF OPHTHALMOLOGY

LIEUT.-COL. E. O'G. KIRWAN, I.M.S., Professor of Ophthalmology, Medical College, Calcutta, who was the official delegate of the Government of India at the above congress, has very kindly sent us a copy of his

report, from which we have prepared the following extract:—

This congress opened in Madrid on Sunday, 16th April, 1933, the inaugural session being held in the amphitheatre of the university under the patronage of His Excellency Senor Don Niceto Alcalá Zamora, President of the Spanish Republic, in the presence of the Ministers of Marine and Public Instruction, the Rector of the University, the Dean of the Faculty of Medicine and over 1,000 members and guests.

Professor Van der Hoeve in opening the proceedings spoke fluently in turn in English, French, German, Spanish and Italian. On behalf of the Congress he greeted the Spanish authorities and spoke with great feeling of the losses sustained by ophthalmology by the deaths of Professors Fuchs, Axenfeld, Lundsgaard, and Roselli and Mr. Treacher Collins, who had died since the last Congress at Amsterdam, four years ago. The members rose and stood in silence to their memory.

Amongst the various demonstrations on the first day was a film by Dr. Lopez Lacarrere (Madrid) showing his method of cataract extraction by coagulation with the diathermy needle, which was of outstanding merit and of special interest to the ophthalmologists working in India where cataract is so common. His method opens up a new field of operative work especially in the case of immature cataract in middle-aged persons threatened with the loss of their job from failure of vision.

Another film shown by Dr. Castroviego (New York) demonstrated experimental work with transplantation of rabbits' cornea. This was most instructive and in his technique the graft is quadrilateral, is cut with a knife, and finished with scissors. No sutures are put in the cornea, the graft being kept in position by a large conjunctival flap.

A third film shown by Dr. Lijo Pavia (Buenos Ayres) was a cinematograph picture of the pulsations of the retinal vessels seen whilst using the Baillart tonometer. Pulse records and blood pressure estimations on the same patients were also shown.

A series of colour photographs of the fundus with detachments of the retina before and after operation were shown by Sabbadini (Rome) and Lijo Pavia (Buenos Ayres).

Dr. W. Comberg's (Berlin) demonstration of the correctness of Helmholtz's theory of accommodation by means of his new slit-lamp on a subject he brought all the way from Berlin with him, and Dr. Troncoso's paper and demonstration on gonioscopy attracted much attention. Drs. Cohen, New, and Killian discussed experiments on the vitreous gel and intra-ocular tension. Dr. O. Wilkinson's paper on the surgical treatment of squint, Dr. J. Arjona's (Madrid) description of a new conservative operation for chronic dacryocystitis, and Dr. Arruga's (Barcelona) description of his procedure on the extraction of complicated cataract should be mentioned.

On the same morning the meeting of the International Association for the Prevention of Blindness took place under the presidency of Dr. Park Lewis (America).

The third day was devoted to the first main subject for discussion 'Tuberculosis of the Iris and Ciliary Body'; the discussion was opened by Dr. Brown (Chicago) who read a paper on modern methods of treatment emphasizing the fact that general constitutional treatment in healthy surroundings is of paramount importance and that ophthalmological treatment and tuberculin therapy, though necessary, are of secondary importance. Professor Igersheimer (Frankfurt) followed with an elaborate paper on the pathological anatomy of the disease, which was ably illustrated by most beautiful microscopic sections. After this Professor Lagrange (Paris) read a brilliant paper on the diagnosis and differential diagnosis of the disease, in which he stated that the histological findings are not proof positive, that the tuberculin reaction alone is hardly confirmative, and that the diagnosis is

mainly one of exclusion. Many members took part in the discussion that followed.

The fourth day (19th April) was occupied in the morning with a discussion on the report of the committee on the international standardization of the visual requirements of aviators, sailors, railway employes and transport workers.

At a meeting of the Council of the Congress under the presidency of Professor Van der Hoeve the following resolution proposed at the last International Congress at Amsterdam was passed and, on account of its importance, it should be widely circulated:—'The XIV International Congress of Ophthalmology, considering that errors of refraction are true diseases and that grave mistakes in diagnosis can result in connection with them; that the examination of the refraction of children's eyes is of extreme importance and that an inexact or incomplete correction may lead to serious consequences later on in life; that errors of refraction in the adult and still more so in the aged may indicate or be the consequence of serious local and general diseases, such as diabetes, glaucoma, cataract, etc., is of the opinion—

(a) that the examination of the refraction of the eye is essentially the work of a medical man;

(b) that this examination being the work of a competent medical man, therefore the prescription of glasses should be done exclusively by doctors;

(c) that as a consequence there are urgent reasons to call the attention of public authorities to the campaign at present being pushed in certain countries to separate the examination of refraction from ophthalmology and make it the legal prerogative of practitioners who are not medical men but style themselves optometrists or optometric opticians or refractionists'.

The fifth day was devoted to the second of the two main subjects for discussion 'Detachment of the Retina'; this discussion was received with a more lively response than the first official subject. The opening paper on the aetiology of the condition was delivered by Professor Arruga (Barcelona) who gave a comprehensive account of the experimental and clinical work done by himself and others. The discussion on the medical and surgical treatments of detachment was initiated by two opening papers by Professors Ovio and Vogt, respectively; in this many members took part. Many other original papers on detachment of the retina were also read. The result of the discussion seems to confirm Gonin's view that a detachment is caused by a hole in the retina and to him should be credited the application of methods of operative cure rather than priority in the discovery of the causation. From a number of papers, it was evident that detachments can occur without holes, and holes in the retina be found without any detachment. Spontaneous cures occasionally take place by rapid pigment proliferation in the region of the hole, or by re-absorption. Treatment of detachment by the Weve electro-coagulation procedure, or one of its modifications, seemed to be popular and to be now preferable to other methods of surgical treatment. Some new methods of therapy were put forward, such as, freezing to produce an adhesive chorioretinitis, by Giambattista, hypertonic saline injection into Tenon's capsule combined with cauterization, by Marquez, and the excision of the sclera combined with diathermy, by Hildesheimer. The workman's compensation factor in detachment of the retina was discussed in papers by Davidson, Arruga, Baudot, and Jeandelize; all agreed that the part played by trauma in its causation should be recognized.

The last day was devoted to various other papers on detachment of the retina and in addition there was a meeting of the International League for the Fight against Trachoma at which a number of interesting papers were read and discussed.

Throughout the whole week there were lavish entertainments, both official and private, to which the delegates were invited; these entertainments included

a reception at the Palacio Nacional, at which each delegate was presented to President Zamora, numerous balls, banquets, visits to places of historical and artistic interest, and a bull fight.

THE ELEVENTH ALL-INDIA RESEARCH WORKERS' CONFERENCE

The following short report of this conference is reprinted from the *Statesman* of 6th December, 1933:—

Important decisions relating to various major diseases in India were reached at the annual meeting of the All-India Research Workers' Conference, which took place in the library of the School of Tropical Medicine in Calcutta.

Major-General C. A. Sprawson, Director-General of the Indian Medical Service, presided over the Conference which was attended by delegates representing various Provinces. Major-General J. D. Graham, Public Health Commissioner with the Government of India, was Secretary.

A large number of papers relating to research work carried out during the year under the auspices of the Indian Research Fund Association were submitted, and several sub-committees were appointed to examine the work done in such important subjects as malaria, cholera, leprosy, kala-azar, rabies, plague, etc. The work on indigenous drugs and drug addiction, skin diseases, and tuberculosis was discussed at the plenary session of the Conference.

MALARIA TREATMENT

In connection with malaria, considerable discussion took place on the necessity for the provision of cheaper and more easily available treatment, to ameliorate malarious conditions in various parts of the country. A resolution was passed by the sub-committee to the effect that, apart from the heavy direct and indirect mortality caused by this disease, attacks of malaria were responsible for a large amount of labour inefficiency, and this formed an economic problem of the first importance. As in the opinion of the committee, the treatment of the sick constituted the first step in any anti-malaria campaign, irrespective of any other methods employed, it was urged that both the Central and Provincial Governments should take all possible measures, at an early date, to provide cheap and adequate means of treatment.

The malaria problem in and around Calcutta and the measures taken to control the situation were also considered. The committee expressed the opinion that the use of aeroplanes for spraying Paris green to control the breeding of mosquitoes could only be applied economically under special conditions.

CHOLERA EXPERIMENTS

The sub-committee on cholera considered experiments in connection with the use of *bacteriophage* for the prevention and treatment of cholera, and came to the conclusion that, on the evidence available, it was not possible to express any definite opinion on the subject, and recommended the appointment of an *ad hoc* committee to go into the data available. Another committee was appointed to co-ordinate the various researches in connection with cholera under the Research Fund Association.

The leprosy sub-committee considered the report of the Leprosy Commission of the League of Nations and the findings of the Leprosy Conference convened by the British Empire Leprosy Relief Association and held in Calcutta in March. It was emphasized that leprosy was one of the major diseases of India, the number of cases being 1,000,000 or more. As it was an infectious disease, the most important means of controlling the menace would be the prevention of contact between infectious cases and healthy people. The committee was of opinion that, with the small financial resources available, it was impossible, at present, to introduce compulsory isolation. The only immediate possibility

was voluntary isolation, which could be arranged for only a limited number of cases in different institutions. It was suggested that patients should be encouraged to adopt isolation in their own homes or villages.

The committee stressed the need for consolidation, co-ordination and extension of anti-leprosy work. It was urged that as leprosy was essentially a public health problem, every effort should be directed to make anti-leprosy work an integral part of the public health system. The committee recommended that a specially trained leprosy officer should be appointed in every Province where the incidence of leprosy was sufficiently large. The formation of Provincial Leprosy Boards was also suggested.

In connection with the problem of tuberculosis, substantial research grants were sanctioned, and a proposal for a tuberculosis survey of Calcutta was sanctioned.

DRUG MENACE

The report of the inquiry into the drug habits prevalent in India showed a large increase in the number of addicts to various drugs such as opium, hemp products, cocaine, chloral hydrate, morphine, etc. It was stated that the use of hemp products (*bhang*, *ganja* and *charas*) was prevalent in every part of India, and 1 to 2 per cent of the population took these drugs habitually, the addict belonging chiefly to the lower strata of society. Unlike opium and cocaine, the physical effects produced by hemp drugs were not very marked, but they led to intellectual and moral degeneration, and there was a distinct relationship between the habitual use of these drugs and insanity and crime.

It was urged that investigation into drug habits in India was very important from the point of view of public health. While considerable attention was being paid to this problem in all civilized countries where the addiction rate was less than 1 to 2 per 1,000 of the population, little had been done in India where the number of addicts was roughly 20 to 30 per 1,000.

QUARTERLY BULLETIN OF THE HEALTH ORGANIZATION

UNTIL recently the publications of the League of Nations have been irregular in appearance, and valuable reports of the Health Organization have had to find homes in various journals, where they have been difficult to trace; however, at the beginning of 1932 the League commenced to publish a quarterly bulletin. It is sincerely to be hoped that the discontinuance of this publication will be the last economy to be effected by the League, as it has already become indispensable to those interested in public health, or more especially international health, matters.

In the present number there is a very important article on housing and malaria, by Sir Rickard Christophers and Professor Missiroli. This article should be read by all malariologists, as in it is summarized all published information regarding anophelism in relation to housing in all malarious countries. The subject is comprehensively dealt with, as the article covers 128 pages. There is another article on the reform of medical education, from Vienna, and the rest of the number is devoted to the report of the Health Organization for the year ending September 1933.

An extract from the malaria paper will be found in our current topics section. The journal can be obtained from the Publication Department of the League, Geneva—price 7s. 6d. annually.

INDIAN JOURNAL OF PEDIATRICS

Few months seem to pass without our being called upon to welcome some new medical journal of British Indian origin. In many cases it is difficult to see exactly which 'long felt want' these journals supply, and even more difficult to put any conviction into our welcoming message. These remarks cannot be applied

in this case. No excuse whatsoever is needed for any step that will stimulate an interest in pediatrics in this country; this is already provided by the appalling infantile mortality rates that are the rule in every town in India. British and foreign journals on pediatrics are of very limited use in the special conditions that exist in this country and the ordinary general medical journals naturally do not fulfil the requirements of the specialist to the full extent.

The journal is to be published quarterly and the first number appeared in October. There is a foreword by Sir Nilratan Sircar in which the aims of the journal are set forth, a birthday greeting from Dr. Robert Hutchison, and an introduction by Professor Czerny of Berlin. To Dr. A. C. Ukil is allotted the honour of contributing the first scientific paper. Dr. Ukil's work on tuberculosis is well known in this country and he has given an excellent account of the subject of tuberculosis in infancy and childhood; his paper is illustrated with some useful skiagrams of children's chests. Other papers are on oedematous nephritis, normal birth-weight and birth-length of Bengali infants, physiological variations in childhood, and avitaminosis in children; there are case reports, reviews of books, and finally some very valuable extracts from current literature; these extracts mostly from pediatric journals in other countries will constitute one of the most important parts of this paper.

The editorial committee are to be congratulated on the production of a high-class specialist quarterly; the articles are well written and well edited, the printing and paper are good, and in appearance the journal will compare very favourably with similar scientific journals in Great Britain and America.

We wish it every success.

THE BERRY WHITE MEDICAL SCHOOL JOURNAL

Most of the large medical schools in India publish an indigenous journal. The practice is one to be encouraged, as it helps to form and cement a bond of fellowship amongst the teachers and students of the school. Pride in one's school must lead to a continuous endeavour to maintain, by personal achievement, the name of the school in high esteem, and this tends to raise the prestige of the medical profession in general.

A new publication of this kind is the *Berry White Medical School Journal*. The number which we have received contains some useful articles written by members of the staff of the school and some interesting essays on medical subjects by students, as well as items of news that will interest all graduates who have passed out of the school.

We wish the journal every success.

THE FACULTY OF TROPICAL MEDICINE, BENGAL

THE following students are declared to have passed the L.T.M. Examination, Session 1933:

Passed

(Arranged in alphabetical order)

1. Sharfuddin Ahmad, L.M.F. (Bihar and Orissa), 2nd medical officer, Sadar Hospital, Monghyr.
2. Harendra Kumar Baidya, L.M.F., private practitioner.
3. Susil Kumar Bhar, L.M.F., private practitioner.
4. Ram Kamal Bhattacharjee, L.M.F. (Bengal), assistant medical officer, Kaliabur Tea Estate, Assam.
5. Rajendra Nath Bose, L.M.F., mosquito sub-inspector, Calcutta Corporation.
6. Debi Pada Chakraverty, L.M.F., medical officer, Sengell Tea Estate, Kurseong.
7. Doraisami Chelliah Daniel, L.R.C.P. (Bom.), railway sub-assistant surgeon, Burma Railways.
8. Nripendra Gopal Das, L.M.F. (Bengal), private practitioner.

9. Tara Kanta Das Gupta, L.M.F. (B. & O.), private practitioner.
10. Bibhuti Blusan De, L.M.F., private practitioner.
11. Samarendra Nath De, L.M.F., private practitioner.
12. Kidar Nath Dutt, L.S.M.F. (Punjab), L.O. (Mad.), sub-assistant surgeon, in-charge, Civil Dispensary, Bahadurgarh, Rohtak, Punjab.
13. Muralidhor Kundu, L.M.F., private practitioner.
14. Mahammad Mujibur Rahman, L.M.F. (Bengal), medical officer, District Board, Mymensingh.
15. Mazhar Hussain, M.B.B.S. (Punjab), private practitioner.
16. Sheo Nath Mehrotra, L.S.M.F. (U. P.), private practitioner.
17. Prayag Naryan Misra, L.S.M.F. (U. P.), assistant house surgeon, S. S. Hospital, Benares.
18. Udayakar Misra, L.M.F. (B. & O.), medical officer, Budh Estate, Orissa.
19. Mohamud Abdur Rahim, L.M.F. (B. & O.), medical officer, Suraj Garha Dispensary, Monghyr.
20. Mohammed Sharif, L.M.F., sub-assistant surgeon (Civil), Punjab.
21. Tara Pada Ray, L.M.F. (Bengal), private practitioner.
22. Sarbans Singh, L.S.M.F. (Punjab), L.M.D. (Reserve), private practitioner.
23. Anil Kumar Sen Gupta, L.M.F., private practitioner.
24. Kamala Prasad Singha, L.M.F., medical officer, Mansur Chalk, Monghyr, Bihar and Orissa.
25. Tara Singh, L.S.M.F. (Punjab), private practitioner.
26. Sivalokanatha Iyer Venkatachalam, L.M.F., private practitioner.
27. Yuen-Yo-Ying, M.D. (Thenen-Yale College of Medicine, China), assistant professor of medicine, National Medical College of Shanghai, China, and Rockefeller scholar.

CENTRAL MALARIA LIBRARY

A MALARIA LIBRARY was founded in Rome by the Stazione Sperimentale per la Lotta Antimalarica in 1925, and an 'Index to Malaria Literature' is issued annually by the Station.

To make this as complete a central malaria library as possible we appeal to all malariologists to send us books, reports and articles on malaria.

Photostat copies of any articles in the library can be had, on request, at cost of production.

All publications and requests should be addressed to 'The Director, Stazione Sperimentale per la Lotta Antimalarica, Corso Vittorio Emanuele 168, Rome (16)'.

DRUG STANDARDS

It is notified for information of the pharmacological laboratories and drug manufacturers that small quantities of the following standard products are available for issue to those wishing to standardize their preparations according to the British and International standards:

1. British standard for digitalis folia (1928).
 2. British standard for strophanthin and ouabain (1932).
 3. Standard pituitary (posterior lobe) powder.
 4. International standard of insulin.
 5. International standard of arsphenamine (sulpharsenobenzene).
 6. International standard of neoarsphenamine.
- Applications should be made to Lieut.-Col. R. N. Chopra, I.M.S., Department of Pharmacology, School of Tropical Medicine, Calcutta.

APPOINTMENT OF DIRECTOR OF WATER EXAMINATION

THE Metropolitan Water Board invite applications from duly qualified medical men and others possessing wide experience in the chemical and bacteriological

examination of water for the position of Director of Water Examination (to succeed the late Sir Alexander Houston, K.M.E., C.V.O., M.B., D.S.C., F.R.S., LL.D.) at an inclusive salary of £2,000 per annum.

Applicants should give their age and state whether engaged in private practice; and applications should embody full particulars of the candidate's experience, qualifications and appointments held. Special attention is directed to the fact that wide experience in the

chemical and bacteriological examination of water is essential. Copies of not more than three testimonials should accompany applications; and an intimation should be given as to the earliest date on which the applicant could take up his duties, if appointed.

Applications should be addressed to the Clerk of the Board endorsed 'Application for appointment as Director of Water Examination', and must reach the offices of the Board not later than 10th February, 1934.

Current Topics

Report on Housing and Malaria

By Sir S. R. CHRISTOPHERS

and

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A NUMBER of points have appeared in the literature regarding housing and malaria which may be said to be still open to discussion. Most of these can be now either dismissed or explained. Some of them relate to two or more separate conditions and are open to two or more explanations.

Malaria houses, if such exist quite in the form this phrase suggests, can only be regarded as houses which, for some reason, are, more than other houses, subject to one or more of the many epidemiological causes which tend to increase the prevalence of malaria in their inmates. Such houses may be specially liable to anophelism, on account of their proximity to breeding places or the extent of these. They may be specially liable to have inmates whose mode of life favours, through carelessness or otherwise, the contraction of malaria. They may have gained their malarial reputation because of their propinquity to a reservoir of virus, a common reason for the 'fever' or 'blackwater' house in the tropics. It is quite possible that some houses do have an increased amount of malaria, due to darkness and other characters favouring aggregation of anopheles, though this is not a reason probably so potent as supposed. It is perhaps even possible, in some cases in Northern Europe, that house construction or character, or the habits of their inmates, have lent themselves especially to the bringing about of an aggregation of partially hibernating female anopheles which have entered and remained, and, once having done so, must almost inevitably be a very serious cause of malaria (winter-contracted malaria). No general law probably explains such a circumstance as a house with a reputation for malaria, or even with an undisputed succession of cases, and the chief interest in our present connection lies perhaps in what degree the last explanation given—i.e., prolonged sojourn in houses, due to partial hibernation—may hold good in some countries. Otherwise, the conception that a dark, dirty, damp house suffers in proportion to its attractiveness to aggregation of anopheles is against the general trend of opinion, which is influenced by the known great mobility of anopheles under normal conditions.

Killing of adult anopheles in houses, except in the case of partially hibernating females, would not appear to be a very profitable method in ordinary circumstances. But it might be a method of great importance if partial hibernation occurred to any extent in actual houses in an area. All methods of destroying the insects would, under these conditions, have a greatly added importance.

Zoophilism is true in a very partial sense in that, in the tropics as elsewhere, cattle act as a diverting and

diluting factor in malaria transmission. The formation of zoophilic strains through selection seems no longer likely to be true, and the very marked features given to 'zoophilism' in Europe are largely due to the occurrence of a variety of *A. maculipennis* (var. *messac*) that has relatively little tendency to feed on man. Similar cases may occur in the tropics, but are more difficult to work out, owing to the large number of species usually present simultaneously in shelters. Up to the present, no such marked zoophilic form as var. *messac* appears to have been definitely recognized out of Europe.

Disappearance of malaria from some areas is probably a complex phenomenon due to various causes, but it appears to have been in some cases due to the fact that only varieties showing small association with man existed in such places and that these have been unable to maintain malaria under changed conditions, which have still further lowered their degree of contact with man. Improved housing may, however, have played its part, possibly in much the same direction. Such changes as were associated with the use of glass windows, for example, may well have played a part in lowering the degree of contact between anopheles and man.

To come to the main issue—viz, how far is house construction a means by which malaria may be controlled—it is possible to say that apparent anophelism does not always indicate the number of anopheles entering the house and leaving it and that, in proportion as the house is lighter and better ventilated, more anopheles tend to leave before morning, though under comparable conditions it is doubtful whether less enter. Any question whether a house by its open and well-ventilated condition is made less suitable to malaria becomes less important by the fact that, if malaria does exist, it is the proper procedure to screen the house and exclude the insects. If so screened, it is relatively unimportant whether such a result might have been attained in a much less degree by improving construction alone.

The results of Missiroli and others in the screening of houses as a means of protection against malaria show, not only the effectiveness of this method, but its relative ease of application. There can scarcely be any doubt, screening is the one salient feature of house character which is important and from a preventive point of view effective. Screening, however, must take note of human comfort and, in warm climates especially, construction and screening, to be effective, must go hand in hand. Next to screening in importance is the overhead fan.

Such a method of combating malaria as screening can apply under present conditions only to a fraction of the malaria problem. Yet this fraction is important. Included in it is the housing, especially of Europeans, in the tropics, which is in itself a matter of enormous importance.

Screening has a quite special application to prevention of malaria in reclaimed areas and schemes of agrarian bonifica, where the whole subject of prevention

of malaria can be taken up from the beginning and worked to. It further has a tremendous importance in regard to the malaria of pioneer settlement in tropical malarious countries, and appears to be the answer as to what is the most appropriate action to take against blackwater fever in such circumstances.

That any kind of screening is better than no screening may be true in some circumstances, but usually, in intensely malarious areas in the tropics, the truth of such a statement is doubtful. Personal protection through the mosquito net is at present the most effective form of protection open to the careful European and one the importance of which should not be subject to any doubt. To some extent, the screened house and the net are antithetic, though not so if the overhead fan be used. To know for guidance to what extent one is protected is important, and to train individuals to trust to imperfect screening is, in this, as in other ways, undesirable.

No such issue should, however, arise, for, if screening is to be carried out as a measure under responsible authorities, its effective and thorough character is of its essence, and it must be supplemented too, not only by constant inspection, but by every possible effort in propaganda and example, if it is to be a success.

Though points in regard to anophelism enter into the question of housing in relation to malaria, they have little to do with the screened house. For summary and conclusions regarding anophelism, reference should be made to the summaries given under different headings in the text of this report, in which an attempt has been made to summarize what is known on the subject. Practical effort meanwhile need not be unduly concerned with subtleties of anopheline behaviour. The issue is rather removed, for the practical sanitarian, to the sphere of human difficulties and human imperfections. It must be admitted, however, that, as yet, any relation between effective malaria prevention and improvement of housing of indigenous rural populations in many non-European countries, and, as applied to the hut in its various forms, does not seem apparent to the authors.

Current Theories of the Ætiology of Pellagra

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I do not propose to deal with theories which have been advanced to explain the causation of pellagra other than those which are dietetic or nutritional in character. To those like myself whose knowledge is derived from a study of the literature, the case seems settled in favour of a dietetic theory. The various theories which have been put forward from time to time, involving an infective agent, have received no continued support or confirmation, and the following facts seem to admit of only one origin, a nutritional origin, for the disease:—

(1) The lack of any evidence of spread of the disease among contacts not receiving the same diet; (2) the absence of recorded instances of nurses and doctors contracting the disease from the patients attended by them; (3) the observed recovery of patients receiving an 'improved' diet in hospital, without other treatment, and the failure to do so on an 'inferior' diet.

The final proof would seem to be contained in the long series of researches carried out by Goldberger and his colleagues, showing that pellagra can be prevented or cured in populations among which the disease is endemic by adding to the diet in sufficient quantity even one only of certain simple foodstuffs, such as meat, milk, tomatoes, wheat embryo, or yeast.

In the attempts which have been made to determine the exact defect in diet by which pellagra is caused,

there are three well-established facts which have formed the basis for special study:—

(1) Pellagra is a disease of poor people in rural districts, subsisting on a limited choice of food, and is rarely, if ever, seen among the well-to-do, who enjoy a richer or more varied diet.

(2) It is almost invariably associated with the use of maize as a staple cereal in diet, and its occurrence in populations subsisting mainly on wheat or rice is something of a rarity, though well-authenticated cases have been reported. The occurrence of pellagra in recent years in the United States as the result of severe alcoholism appears, at first sight, to be another exception to the above rule; it may, however, prove to be otherwise (see below).

(3) It is a disease of warm and sunny countries, a fact which may, however, be partly connected with the fact that maize is often the cheapest cereal in such localities, as, for example, in Egypt, Italy, Rumania, and the Southern United States, where pellagra is prevalent.

The above facts must be satisfactorily accounted for in any theory which professes to explain the ætiology of pellagra, and it is especially the connection of the disease with the consumption of maize which will form the subject of this paper. For it is just in this respect that the two main theories which are current to-day break down. There are, first, the theory connecting pellagra with an amino-acid deficiency in diet; and, secondly, that associating the disease with a vitamin deficiency.

THE THEORY OF AMINO-ACID DEFICIENCY

The association of pellagra with maize consumption led naturally to the conclusion that the disease might be caused by a lack of protein of high biological value; in other words, by a deficiency in the diet of certain essential amino-acids. The proteins of maize have been shown to consist, to the extent of 58 per cent of zein, the notoriously incomplete protein lacking the important amino-acids tryptophane and lysine. The work on zein of Willcock and Hopkins, and of Osborne and Mendel, which is too well known to need description, showed conclusively that young animals fed on diets containing zein as the sole source of protein could not maintain their weight unless tryptophane was added, and were unable to grow unless lysine was given.

Zein is thus a protein of low nutritive value incapable of replacing completely the daily nitrogenous waste of the body. Maize glutenin, which forms 36 per cent of the protein in maize, is, however, more complete in the essentials in which zein is lacking, and tends to supplement the latter, when maize is consumed.

Animal proteins as a class contain a more varied assortment of amino-acids than vegetable proteins (e.g., those of cereals, vegetables, and legumes), and in this respect may be assumed to resemble more closely those contained in the tissues of the animal they are used to nourish. It is generally true that nitrogenous equilibrium can be obtained on a smaller intake of animal, than of vegetable, protein; in other words, animal proteins have a higher biological value. The observed good effect on pellagra of adding meat, milk, and eggs to the dietary can therefore readily be explained as due to the advantage of giving a richer variety of essential amino-acids.

The theory that pellagra is developed on a maize diet as the direct result of an amino-acid deficiency is therefore a reasonable and attractive hypothesis, and the last 20 years have seen many laborious investigations carried out with the object of determining the relative biological value of the proteins of the commoner foodstuffs. The experimental work has been of two types: (1) comparison of the minimal proportion of different proteins required in a dietary, as the sole source of nitrogen, in order that young animals may be reared to maturity; (2) short-term metabolic observations in which determination is made of the minimal

intake of different proteins required to maintain nitrogenous equilibrium.

WHEAT *versus* MAIZE

The sum of the work on the subject leads to the conclusion that a theory of the causation of pellagra based on a defective protein supply in diet will not explain the connection between the incidence of the disease and the consumption of diets consisting largely of maize. It is questionable, however, to what extent it is justifiable to apply the results of short term experiments on nitrogenous equilibrium, such as the above, to the case of populations subsisting largely on maize for long periods. The experience of mankind is certainly in favour of wheat rather than maize as a staple, and the latter is usually eaten from necessity rather than choice. The experimental work, in which young animals have been reared on diets containing proteins derived from one cereal only, has often given results in favour of wheat rather than maize. These experiments have, however, been criticized on technical grounds in the general review of the subject given by Mitchell, who has also pointed out that pellagra is a disease mainly affecting adults and, in this respect, differs from many other diseases of nutritional origin to which young children are especially susceptible.

THEORY OF VITAMIN DEFICIENCY

Ten years ago it would have been true to say that the current opinion, among those who had devoted most time and energy to the study of the subject, was that pellagra was the result of a defective provision of protein in the diet. Among those holding this view were Goldberger and his associates working in the laboratories of the U. S. Public Health Service at Washington. There was, however, one important observation which was not in agreement—namely, that made by Voegtlin and others in 1920, that pellagra could be cured, or influenced favourably, by addition to the diet of protein-free extracts made from the liver or the thymus gland. Other aberrant facts were those discovered by Goldberger and Tanner in 1925, who showed that the protein caseinogen, even when given in large amounts (46–90 g. daily), did not act as a satisfactory cure, often causing only temporary improvement, while excellent cures were obtained with 30–50 g. (dry weight) daily of a yeast extract which could only have contained traces of protein.

The results of experimental work with rats enabled Goldberger and his colleagues to identify the pellagra-preventive substance in yeast with a constituent of the water-soluble B-vitamin complex, and provided the proof of the fact, long suspected, that the water-soluble B-vitamin contained at least two constituents, both of which were found necessary for the continued growth and development of the rat: (1) the more heat-labile, antineuritic vitamin B₁, necessary to prevent beriberi in man and polyneuritis in birds and mammals; (2) a more heat-stable constituent, in absence of which young rats developed a pathological condition marked by a symmetrical dermatitis, which was considered to be the analogue of human pellagra. The latter dietetic factor Goldberger called the P-P, or pellagra-preventive, vitamin; it is now generally known as vitamin B₂ in Europe, or vitamin G in the United States.

A remarkable similarity is shown in the distribution of (a) vitamin B₂, as determined by experiments with rats; (b) the pellagra-preventive factor, as shown by clinical trials; and (c) the black tongue preventive factor, studied on dogs. The conclusion is irresistible that these three dietetic factors are identical.

It is, however, when the distribution of vitamin B₂ among the cereals is studied that the analogy between the experimental work and the facts of human pellagra breaks down. Aykroyd, using rats as experimental animals, made a careful study of the vitamin B₂ content of wheat, maize, rice, and millet. The cereal to be tested was incorporated as a high percentage of the basal diet, which contained all known essential elements,

including the antineuritic vitamin B₁, and the growth of young rats was observed over a period of several weeks. While these foodstuffs are low in vitamin B₂, they were found to be by no means devoid of it. Whole wheat was found to have the highest vitamin B₂ content, then whole maize, and lastly unmilled rice and millet; animals receiving 30–50 per cent of rice in the diet grew very little more (4 g. average weekly increase) than those on the basal diet without cereal supplement (3 g.). The endosperms of wheat (white flour), of maize (maize grits, maize flour, hominy), and of rice (polished rice) were found to be of an equal, but low, value. The very definite superiority in vitamin B₂ content of whole maize over unmilled rice and millet, and the lack of evidence of any inferiority of maize endosperm as compared with that of wheat or rice, are facts which fail to explain the connection of pellagra with the consumption of maize, whether in the unmilled or milled form. If pellagra were indeed caused by a simple deficiency of vitamin B₂ it should occur chiefly where populations subsist on poor diets containing rice, rather than maize, as a staple, and it should be no more frequent among those nourished chiefly on maize products than among the poorer classes in countries where wheat is the cereal used. This, however, is not the case. Among rice-eating people, beriberi and not pellagra, is the menace to those whose diet is lacking in supplementary foods, and this is also true where the food consists too exclusively of white wheaten bread and flour, as, for example, was found by Aykroyd in Labrador and Newfoundland.

THEORY OF A MAIZE TOXIN

While both the theory of amino-acid deficiency and that of vitamin deficiency give a satisfactory explanation of many of the facts connected with the etiology of pellagra and with its prevention and cure, both fail to account for one very characteristic feature—the usual association of the disease with the consumption of maize. There remains, however, a hypothesis which has received many adherents in the past—*viz.*, that maize contains a definite poisonous substance and that pellagra is caused by its toxic action. The literature on pellagra published in the second half of the nineteenth century is almost entirely concerned with this theory and the evidence, clinical and experimental, in its favour. Most of this emanated from Italy, where pellagra at that time was recognized as a serious menace, and was the subject of intensive study.

The occurrence of the skin lesions on exposed parts of the body in pellagra led to the idea that maize might contain a photo-sensitizing substance analogous to that contained in buckwheat, and this suggestion received experimental support in the oft-quoted experiments of Horbacewski.

The toxic substance separated from maize and other cereals by Stockman and Johnston caused paralysis in monkeys and other animals, but no mention is made of dermatitis and other skin lesions.

In more recent years Jobling and Arnold have produced experimental evidence that toxic substances are produced in the intestine as a result of a maize diet. Fungi (supposed by these authors to be derived from the maize ingested), producing fluorescent substances in culture, were isolated from the faeces of 5 out of 9 acute, and of 2 out of 23 chronic, cases of pellagra, and in no instance from the faeces of 50 non-pellagrous persons examined. Extracts of the fluorescent material when injected into mice were found to render these animals sensitive to light; they developed swelling and oedema of the eyelids, reddening of the ears, and death occurred in some cases. This very suggestive work has received no published confirmation in the intervening years; the authors state that the disappearance of the disease in their locality prevented continuance and completion of the work.

A recent series of observations by Sabry on treatment of pellagra in Egypt by injections of sodium thiosulphate are interpreted by the author as showing a specific

action of this drug in neutralizing a toxin derived from maize circulating in the blood. This toxin is identified with dioxyphenylalanine (dopa) a substance nearly allied to tyrosin, and is held to be responsible for the characteristic skin erythema and the hyper-pigmentation on the exposed parts.

In view of these suggestive, if contradictory, results, it seems likely that the search for a toxic substance in maize and maize products is deserving of more attention in the future. There has been, and still is, a persistent conviction in many quarters among those in direct contact with the disease that deteriorated maize is particularly liable to cause pellagra, an idea reminiscent of the analogous theory, often advanced, that beriberi is frequently connected with the consumption of damaged rice. Experiments at the Lister Institute have given indications that maize diets which have been kept rather too long before feeding may be unwholesome, in comparison with similar diets containing wheat products. The results are not, however, consistent, and further experimental work on this point is needed and might yield valuable results.

A THEORY COVERING THE KNOWN FACTS

An attractive hypothesis that seems worth exploring would be that pellagra is caused by some toxic substance derived from maize which is rendered innocuous by the action of the P-P (pellagra-preventive) vitamin or vitamin B₃, if present in sufficient quantity in the diet. Such a theory would explain the observed curative and preventive action of the food—yeast, liver, milk, and meat—all of which are rich in this vitamin. The fact that maize is no poorer in vitamin B₃ than other cereals would then be no stumbling-block, since pellagra would naturally tend to develop on one-sided diets consisting largely of maize. For such diets would require an extra provision of vitamin B₃ to counteract their toxic properties and to ensure correct nutrition, and if the foods required to supply the necessary amount of vitamin B₃ were not forthcoming in the other constituents of the diet, the occurrence of pellagra would be expected.

The conception of a dietetic disease being due to a positive toxic agent combined with a vitamin deficiency is not a new one. There are many analogies: indeed, one of these dates from the discovery of the first vitamin.

A following theory of the cause of pellagra is suggested: *Pellagra is caused by a toxic substance derived from the maize diet, which can be corrected by sufficient 'good' protein, or perhaps by sufficient vitamin B₃ (which is found to accompany the 'good' proteins).*

The symptoms of vitamin-B₃ deficiency as studied in the rat—the irregularity of the occurrence of the dermatitis and the frequent absence of severe intestinal symptoms—throw some doubt on any supposition of identity between this condition and human pellagra. It is possible that the effective antidote to the maize toxin is neither the 'good' protein, nor the vitamin B₃, but in reality some unknown water-soluble substance which is found with these in nature or derived from them in the animal's economy.

The occurrence of pellagra in the United States among severe alcoholic addicts, which is reported to be increasingly prevalent and to have been relatively infrequent before the period of prohibition, is possibly connected with the fact that the illicit liquor may largely consist of 'corn whisky' distilled from maize products. The habit of the alcoholic addict to take little other food during periods of excessive indulgence would explain the failure to neutralize poisons derived from the maize liquor. Alcoholic pellagra has rarely been reported in those parts of Europe, where whisky is distilled from barley, and where none of the usual strong liquors are derived from maize. In Rumania, however, where pellagra is a prevalent disease at the present time, maize frequently the staple cereal and 'whisky' often distilled from maize, the idea of an

association between pellagra and the excessive consumption of alcohol is widespread among both the medical profession and the laity.

The suggestion put forward above that pellagra may be caused by a toxin derived from the diet, which can be corrected in the presence of certain foodstuffs (such as meat, milk, eggs, green vegetables) if given in sufficient quantity, is, at present, a speculation. It might, nevertheless, serve as a useful working hypothesis to those studying the aetiology of pellagra whether by the experimental or clinical method. It is put forward in the hope that by its use research may be stimulated in certain directions, which may result in further progress toward the solution of the mystery which at present shrouds the cause of the disease.

(Note: A similar theory was put forward some years ago by Aeton and other workers at the Calcutta School of Tropical Medicine regarding the aetiology of epidemic dropsy; however, experimental proof of the neutralizing power of the vitamin concerned was not forthcoming. Editor, *J. M. G.*)

Amoebic Liver Affections: Symptoms and Treatment, with a Review of 25 Cases

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SINCE the introduction of emetine and other more recent drugs in the treatment of amoebic dysentery, amoebic liver abscesses have become relatively uncommon in Egypt, but cases still occur from time to time.

The following observations are based on 25 cases of amoebic liver involvement admitted during the last eighteen months in which definite abscess formation was present, or where such a marked liver enlargement was found that the presence of an abscess was considered extremely likely.

Amongst these 25 cases only one was a female, and she suffered from amoebic hepatitis which did not progress to abscess formation. The relative immunity of the female sex in this series coincides with other observers' experience.

This greater frequency in males is probably due to the much higher incidence of dysentery in male patients, a well-known fact in admissions to Kasr-el-Aini Hospital. This may be due to the lesser risk of infection of females who, living mostly indoors, are less exposed to the risk of eating and drinking contaminated food and water.

Are we justified in concluding from this difference between the relative incidence of amoebic enteritis and that of amoebic hepatitis in the male and female sexes that males, if affected with dysentery, are about one and a half times (11 to 6.55) more liable to hepatic complications?

Alcohol, as suggested by some authorities, does not seem to be an important aetiological factor in Egypt, being forbidden by the Mohammedan creed; besides, in the majority of our cases there was no suggestion of indulgence in alcohol. Spices are equally partaken of by both sexes.

HISTORY OF DYSENTERY

This could be obtained in 13 out of the 25 cases, that is, in about 52 per cent. Vegetative forms of amoebae were found roughly in a quarter of the cases, while sigmoidoscopic evidence was positive in 6 out of 10 cases investigated by this method, the remainder of the cases not being examined as their general condition on admission contra-indicated the fatigue of proper preparation and examination. The interval between the first history of dysenteric symptoms obtainable from the patient and the onset of the hepatitis varied from one case with the onset of hepatic and intestinal

symptoms appearing together to one case where an interval of twelve years elapsed before hepatic symptoms were complained of, eight cases out of 13 occurring within six months.

Eight cases still had intestinal dysenteric symptoms on admission, while two developed hepatitis while under treatment for their dysentery.

ONSET

The first symptom was pain in 23 cases out of 25. Fever and rigors accompanied the pain in seven; of the two cases who had had no local pain, symptoms began in one as a perforated amœbic ulcer of the large intestine with generalized peritonitis. Before death dullness of the right base was detected and 200 cubic centimetres of brownish offensive pus were evacuated. In the second case the patient complained only of an epigastric tumour which proved to be a liver abscess.

The onset of hepatic symptoms was usually gradual, being sudden in only three cases.

The pain was most marked: over the subcostal region at the costal margin in six cases; in the thoracic wall above the subcostal margin in five cases; over the abdominal wall in nine cases; both above and below the costal margin in three cases.

It usually consisted of a dull heavy pain, but later a stabbing, lancinating element was frequently added to it, localized over the area of previous maximum tenderness, and aspiration over this point showed the abscess to be situated just underneath.

Shoulder pain of a dull rheumatic character was marked in seven cases, five over the right, two over the left shoulder occurring respectively in cases of right and left lobe abscesses. In one case the pain was localized deep in the armpit, but in all the others its site was over the acromion.

In five of these cases the abscess was situated in the upper part of the liver, while in the other two only a hepatitis was present. Not frequently the patient gave a previous history of recurring attacks of pain in the liver region of a similar nature to that found on admission.

CACHEXIA

The larger collections were associated with the most marked cachexia.

In the four cases that were cured by emetine alone without aspiration, wasting was not a prominent feature.

Slight jaundice accompanied the cachexia in five cases, consisting only of a subicteric tinge of the conjunctivæ and some earthy discoloration of the skin. In one of these cases no jaundice was present on admission, but the patient gave a history of slight jaundice one month prior to coming to hospital.

FEVER

Fever was absent throughout the illness in seven cases; it reached 100.4°F. in 13 cases; from 100.4°F. to 104°F. in five cases.

Patients with large collections of amœbic material showed only a moderate degree of pyrexia, while of the four cases showing high temperature two had a simple hepatitis and one was secondarily infected. This indicates how variable the temperature may be, and that a hepatitis may be either afebrile or cause a high swinging temperature, while very large abscesses are usually accompanied by moderate pyrexia only.

LEUCOCYTOSIS

The average count was 17,220, polymorphonuclears 70 per cent, lymphocytes 22 per cent, hyalines 5 per cent, eosinophils 1 per cent, the maximum being 37,400, the minimum 10,000.

The maximum hyaline count was 16 per cent in two cases, while the average was 5 per cent.

SITUATION OF THE ABSCESS

The enlargement of the liver was chiefly upwards in six cases, downwards in ten cases, both upwards and downwards in nine cases. In 13 cases the liver extended more than three fingers below the costal margin.

The situation was usually anterior; in only three cases was it posterior, and aspiration carried out from behind.

The left lobe was affected alone in three cases, and in another two cases both lobes appeared to be affected. In one of these pain was localized in the left side.

In another case the enlargement was in the middle line with left shoulder pain. The swelling was wholly abdominal and subsided under emetine treatment without aspiration.

The lungs frequently showed some signs of congestion, bronchitis or crepitations; in one case there was acute pleurisy and in another a lung abscess secondary to the liver abscess was discovered. In a third case the patient complained of a bitter taste of the sputum which had a rather yellowish tinge. Here the discoloration disappeared from the sputum after aspiration of the liver collection had been performed; had aspiration not been done, rupture into the lung would almost certainly have occurred.

After the lung complications, we found spread of the liver condition to the parietes to be the next most frequent occurrence. One case was admitted with a fluctuating swelling in the abdominal wall, and it was difficult to determine from ordinary clinical examination whether the abscess was a primary staphylococcal collection in the abdominal wall—a not infrequent occurrence in Egypt—or an hour-glass abscess extending from an amœbic liver condition. Exploration with a needle and syringe showed the fluid to be chocolate-coloured amœbic material and aspiration of the underlying liver collection was then successfully done.

A second case showed a small fluctuating swelling in the eighth intercostal space below the angle of the scapula with an impulse on coughing. There was also a second elongated swelling extending up the back superficial to the erector spinæ muscle as high as the first dorsal vertebra and as low down as the sacrum. The diagnosis of cold abscess or of a localized pointing empyema was considered, but exploration revealed thick liver-coloured material and aspiration of the liver in this situation removed 250 c.c.; attempts to aspirate the swelling along the lateral margin of the spine failed to withdraw anything, but on removing the needle and applying pressure on the swelling directed towards the site of the puncture watery brownish-coloured fluid was expressed and the swelling subsided. The case recovered rapidly without further aspiration.

These two cases show of what assistance exploration may be in the diagnosis of doubtful fluctuating swellings.

In the third case after aspiration the pus re-accumulated, the abscess pointing through the abdominal wall.

Another patient had on admission an abscess forming a localized epigastric tumour. Before he could be aspirated this abscess ruptured into the peritoneal cavity, the epigastric tumour disappearing. The patient was found in a state of profound collapse with shifting dullness in his abdomen. The peritoneal fluid was tapped and he made an uneventful recovery.

In all, seven cases showed involvement of surrounding organs or tissues. It may be mentioned here that in practically all cases operated upon previous to the series here reported, the liver was found adherent to the parietal peritoneum, this preventing leakage of any abscess material into the general peritoneal cavity during aspiration, while in no case aspirated either through the abdominal wall or through the chest did any mishap occur, the cases all recovering completely.

Displacement of the mediastinum and heart does not take place to such a marked degree as occurs with collection of fluid in the pleural cavity, and this may occasionally be of some assistance in differentiating a collection below the diaphragm from one in the pleural cavity. In the 25 cases here described five showed displacement of the heart to the left in large right-sided liver abscess, and one to the right in a left-lobed abscess. X-ray examination was found of considerable

help in the diagnosis of amœbic involvement, usually showing elevation or fixation, or both, of the dome of the diaphragm corresponding to the site of the abscess.

In cases, however, where secondary lung involvement was present, x-rays not infrequently failed to demonstrate the position of the diaphragm owing to the increased density of the diseased lung above or the presence of fluid in the pleural cavity.

In cases where the lower part of the liver was principally involved, little or no elevation of the diaphragm was present, but the movements were limited, and even this limitation of movement was sometimes absent.

TREATMENT

The routine treatment adopted in these cases was to commence with emetine gr. 1 or 2, depending on the general state of the patient; this was continued for five to seven days before aspiration was attempted, provided the patient's condition justified delay in evacuating the collection. The treatment with emetine was given in order to liquefy the abscess material and make it more easily aspirated, as previously we had frequently experienced considerable difficulty in aspiration owing to the thick nature of the material. Another advantage in the preliminary emetine treatment is that in cases where doubt exists as to whether an abscess is actually present or only hepatitis, and this is not infrequent, the treatment assists in determining whether aspiration is necessary or not. Two cases on clinical examination suggested a definite collection of pus; in one of these the liver reached the level of the iliac crest and formed a rounded, nearly hemispherical swelling. The leucocytic count was 18,000 with 80 per cent polymorphs, while the patient suffered from rigors and intermittent fever. Puncture was postponed for a few days and under emetine everything quickly subsided.

In another case the liver extended from the fourth space above to the umbilicus below. X-rays showed the right diaphragmatic dome to be fixed and raised while there was considerable abdominal rigidity and tenderness. The leucocytic count was 37,400 with 79 per cent polymorphonuclears. After the third emetine injection the liver had so definitely receded and the symptoms so markedly subsided that puncture was postponed, and later was not found necessary.

It is important to remember that some cases of amœbic hepatitis may show considerable delay before responding to emetine treatment. One case began to show improvement only after the eighth grain had been given, the liver subsequently subsiding without any operative interference. In this patient, owing to delay in diminution of the liver swelling, it was considered that an abscess was most likely present but aspiration entirely failed to reveal any pus.

As regards the toxic effects of emetine we consider that in addition to observations on the heart sounds and on the area of cardiac dullness it is important to keep a daily record of the blood-pressure as an indication of the action of the emetine on the cardiac muscle, a falling blood-pressure usually demanding care in the further administration of emetine. These blood-pressure records were frequently found of value.

The blood-pressure was frequently low before commencing treatment, and in these cases $\frac{1}{2}$ gr. doses were given. If during the course of treatment the blood-pressure fell considerably, one or two days' rest was given.

We have found that the blood-pressure not infrequently shows a rise after aspiration of the abscess despite the administration of emetine, this being apparently due to the removal of toxic material.

The only other complication of emetine we observed was in one case a generalized desquamation of the skin which subsided after stopping the drug. The subcutaneous method of administration was found less painful than the intramuscular.

We wish to emphasize the absolute inefficiency of any other amœbicidal drug to influence the hepatic process.

In one case under stovarsol per os and yatren 2½ per cent per rectum, an abscess actually developed while under treatment with these drugs, and in another under emetine bismuth iodide 3 gr. daily and yatren per rectum a liver abscess formed and spread through the diaphragm, causing an abscess of the lung. Emetine by injection is apparently the only drug that can affect the *Entamoeba histolytica* in the liver. As its effect on the gut is much less certain and lasting we consider it advisable to associate it with treatment by yatren per rectum. This plan we have recently followed in our cases with very excellent results.

SITE OF PUNCTURE

The site chosen was the most tender point, whatever its situation. This, besides showing the probable point where the abscess is nearest to the surface, frequently overlies a patch of previous pleurisy or peritonitis where adhesions have formed.

In eight cases the site chosen was above the costal margin, two being done in the posterior scapular line, two in the mid-axillary line, three in the anterior axillary line, and one in the left chest anteriorly. In four cases puncture was made in the abdominal wall. In one case we aspirated a lung abscess through the right axilla with complete success.

When carrying out aspiration of these liver abscesses careful local anaesthesia with novocain through a long fine needle was first performed. We sometimes found, after inserting this needle for anaesthetizing the site of puncture, that amœbic pus could be withdrawn through it into the anaesthetizing syringe even though the needle was a fine-bored one.

After anaesthesia aspiration was performed with Potain's apparatus, using the thickest bore needle and while this was being carried out a drop of pus was examined, both fresh and stained, under the microscope and subsequently a specimen was sent to the laboratory for culture.

During aspiration the position of the point of the needle was directed to different situations in the abscess until all the pus had been aspirated. Usually the wall of the cavity could be felt to contract down on the needle and soon, instead of feeling it absolutely free, it was found to be surrounded by solid tissue. Sometimes this contraction of the walls of the abscess would block the free end of the needle, which would have to be withdrawn a little before more pus could be obtained. During the withdrawal of the fluid the liver, by palpation and percussion, could be shown to contract down often to a remarkable degree.

In one case where the liver extended across the abdomen at the level of the umbilicus, before aspiration we had considered the possibility of two abscesses, one in the left lobe and a second in the right lobe, but on aspirating 3,650 c.c. from the right side complete subsidence of the swelling took place, showing that it must have been a solitary collection displacing the left lobe. There was only one case in which we definitely diagnosed two separate abscesses. Aspiration was undertaken first in the left seventh space and as some swelling still persisted after withdrawal of all the fluid a second aspiration through the abdominal wall midway between the umbilicus and the xiphisternum was carried out and the second collection emptied.

The shape and extent of the abscess cavity could usually be accurately estimated by careful manipulation after insertion of the needle.

One or two aspirations were usually sufficient, but in one case it had to be repeated three times and in another four times.

Where the pus withdrawn was obviously septic, as shown by the presence of numerous pus cells and organisms under the microscope, the case was referred to the surgeon.

In one case where the material was found to be septic in nature, operation revealed multiple streptococcal abscesses, and in another, a patient coming from Palestine, a suppurating hydatid cyst was found at operation, a condition of extreme rarity in Egypt. This was opened, evacuated, filled with iodoform glycerine paste and drained. The patient recovered completely.

The colour of the pus was of the typical chocolate or anchovy sauce appearance. Occasionally, on commencing the aspiration, a yellowish-coloured fluid was obtained, but as aspiration proceeded the typical anchovy appearance was seen. In one case an abscess of the lung was shown to have occurred secondary to a liver abscess by this characteristic colour. Where many aspirations were done the pus was usually thinner and darker in the later ones.

The consistency of the abscess material was usually fairly thick especially towards the end of an aspiration, and considerable patience was required as the needle tended to get blocked during the process.

No amœbæ were found on microscopical examination of the withdrawn material, only debris was seen with very rarely a few pus cells. In a number of cases, however, mild infection with staphylococci or Gram-negative bacilli was present, but this did not necessitate anything more than aspiration, the condition subsiding despite the signs of slight infection.

SUMMARY

(1) Twenty-five cases of amœbic involvement of the liver were reviewed.

(2) The rarity of its occurrence in females is stressed, this in our opinion not being influenced by alcohol or nature of food, but more by exposure to and occurrence of amœbic intestinal infection.

(3) The average age was 35, but one case is described where an amœbic abscess occurred at the early age of 3 months.

(4) In only 52 per cent of cases was a history of dysenteric bowel involvement obtained.

(5) Fever was often absent.

(6) The average leucocytic count was 17,000. polymorphonuclears 70 per cent, lymphocytes 22 per cent, hyalines 5 per cent, eosinophils 1 per cent.

(7) The situation of these abscesses is discussed.

(8) Seven cases with involvement of surrounding structures occurred: three in the lung, three in the parietes, and one ruptured in the peritoneal cavity.

(9) The importance of treatment with emetine by the subcutaneous route is emphasized, two cases being described where amœbic abscess formation apparently occurred during other recognized methods of treatment for intestinal amœbiasis. Where the condition of the patient allows of delay, emetine treatment prior to aspiration is considered advisable, this leading to cure in certain cases where abscess formation was suspected, and assisting liquefaction of the contents and diminution in the congestion of the surrounding liver where abscess formation had already occurred, thus making the aspiration a safer and easier procedure.

(10) The importance of recording daily the blood-pressure in addition to other methods of determining the effect on the heart is emphasized as an indication to the effect of the emetine on the myocardium.

(11) The best indication as to the point to select for aspiration where there is no other definite localizing indication is the site of maximum tenderness whatever its situation. A wide-bored needle is essential.

(12) Examination of the pus at the time of aspiration, naked-eye and microscopical, was found to be of considerable assistance in determining the line of treatment to be followed, the presence of numerous pus cells and organisms suggesting the advisability of an open operation.

(13) In certain cases, despite the presence of a few pus cells and organisms, aspiration with emetine was found to bring about a cure.

(14) Aspiration is considered to be the most satisfactory line of treatment in amœbic liver abscess where no contra-indication to this line of treatment exists.

The Modern Treatment of Venereal Diseases

By L. W. HARRISON, D.S.O., M.B., Ch.B., F.R.C.P.E.

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GNORRHOEA

It is often said that the modern treatment of gonorrhœa affords no better results than did that of twenty or thirty years ago; such a view is unwarranted. Certainly to the casual observer the average attack of gonorrhœa seems to last as long to-day as it did in earlier times, but, if end-results are compared, the superiority of modern methods is obvious to anyone who has practised in this branch for more than twenty years. Formerly the determination of cure was very uncertain, depending mainly on the absence for a few days of visible discharge; now in good hands the patient is not dismissed as cured until prolonged observation with many bacteriological tests have failed to disclose gonococci. The treatment of chronic gonorrhœa was haphazard, and its cure was more a matter of good luck than good management; now the up-to-date worker proceeds on systematic lines to discover the cause of the chronicity and concentrates on that, with consequent shortening of the attack. Treatment methods were more violent, and the mucous membrane of the urogenital canal was often left in a permanently unhealthy condition; to-day the infrequency of urethral stricture as compared with earlier times testifies to the superiority of the milder, more rational, more precise and thorough treatment now practised by good workers.

Probably most of these would agree that the longer they have worked at the problem of evolving a sound treatment of gonorrhœa the more they have become convinced of the paramount importance of two principles to be observed, namely the maintenance of efficient drainage and the stimulation of an adequate resistance to the gonococcus. There is nothing new in the principle that efficient drainage is essential to the cure of a microbial infection, and its importance in gonorrhœa has been recognized for a number of years, though it still seems often to be overlooked by some who attempt to stem the flow of purulent discharge in the acute stages by applying strong astringents, and in the later stages, instead of searching for and concentrating their treatment on those parts of the urogenital tract where colonies of gonococci are more or less locked up below the surface, try blindly the passage of sounds, massage of the prostate, courses of vaccines and other methods they have read of as being good for chronic gonorrhœa, without any definite idea of what any of these things is doing for the particular patient. The importance of resistance has been recognized in a general way, but the difficulty has been to gauge it. For example, those who treat gonorrhœa rationally know that it does not pay to bludgeon the tissues with strong chemicals and that the patient must not do things which tend to lower his general fitness. It has often been noted, also, that such a complication as epididymitis or a peri-urethral abscess has brought an attack of gonorrhœa abruptly to an end, and it has been supposed that the complication must have generated such a large production of antibody as to annihilate the micro-organisms. But, except for the observation that the strength of the complement fixation reaction with a gonococcal antigen is commonly raised by a complication of gonorrhœa, it has not been generally recognized that this test is a practical gauge of the patient's resistance. D. Thomson, when working at the Military Hospital, Rochester Row, during the war, found that, coincidentally with the clinical improvement of a refractory case under well-regulated vaccine

treatment, the titre of the complement fixation rose. More recently P. A. Clements, investigating at the Venereal Diseases Department, St. Thomas's Hospital, the effects of a special vaccine prepared by J. Oliver on the principles elaborated some years ago by Dimond, has confirmed this observation. He has found that in many intractable cases of gonorrhoea, cases mostly with a very slight discharge containing gonococci in which the disease has persisted for months in spite of careful treatment, the complement fixation reaction has been negative or only doubtful, and that when the administration of the special vaccine has been followed by a marked increase in the strength of the reaction to strongly positive, all symptoms and gonococci have disappeared; conversely, when the reaction has not increased in strength the disease has remained. Here it may be mentioned that I have often seen cases of chronic gonorrhoea with negative complement fixation reactions after courses of ordinary gonococcal vaccine, and see in this an explanation of the difference of opinion on the value of the vaccine treatment of gonorrhoea. The gonococcal complement fixation test shows that gonococcal vaccines differ considerably in antigenic power and also that patients differ in their response; a given vaccine may fail to raise the titre of the reaction in any case while another may fail in some but succeed in others. The value of the complement fixation test lies in the fact that, by it, one can judge much more quickly than by observation of clinical effects whether or not a vaccine is effecting its purpose. Again, in a number of cases studied in the investigation just mentioned it has been found that, when the complement fixation reaction was strong but the disease persisted, one could be practically certain that the sole requirement for cure was the discovery and treatment of badly draining foci.

The above general remarks may explain the following sketch of what I believe to be sound treatment of average cases of gonorrhoea. In acute gonorrhoea of males it is generally agreed in this country that there is little to be done at first besides washing the urethra twice daily with a mild lotion and that this is better done with an irrigator than with a syringe, provided that the irrigator is placed no higher than 3 to 3½ feet above the urethra. Personally I believe in allowing the lotion to flow into the bladder as soon as the patient has acquired the knack of relaxing the compressor urethra, but not in forcing the sphincter by using strong hydrostatic pressure; another condition is that only mild, comparatively non-irritating lotion is used. As to the nature of the lotion, potassium permanganate, 1 in 12,000 to 1 in 8,000, seems to be as useful as any and better than most for average cases, but, as changes, acriflavine (1 in 5,000), mercurochrome (1 in 2,000 to 1 in 1,000), mercury oxycyanide (1 in 8,000 to 1 in 4,000), protargol (1 in 1,000) and silver nitrate (1 in 20,000 to 1 in 10,000) may be found useful. With regard to general treatment, regular hours, mild, unspiced food, and abstinence from alcohol and spiced drinks are essential. Medicines are not really necessary in the majority of cases, but a sedative diuretic with belladonna in it seems to be useful in allaying spasm. With regard to vaccine treatment, I prefer now to wait until the symptoms have abated, regarding the vaccine as a mild spur to be used when the tissues appear to be flagging in their efforts to throw out the gonococcus. If and when the symptoms have settled down to a morning gleet with clear urine containing heavy threads and the patient seems to be making no further progress towards recovery, it is essential to make a thorough and detailed examination to discover the cause. It lies in defective resistance or/and in one or more badly draining foci. The blood is tested for the complement fixation reaction, and if this is not found to be strongly positive, vaccine treatment is instituted. It is impossible to give precise directions for the administration of vaccines because so much depends on the make of vaccine employed, and moreover patients vary greatly in their response. Generally, however, I believe that

the intracutaneous route is better than the subcutaneous, and I would start with a very small dose, say, 10 millions, which is increased by about 50 per cent at intervals of 3 to 4 days until a definite reaction occurs in the form of a well-marked area of irritation round the site of the injection, a rise of temperature to 99°F. or perhaps 100°F. and a slight increase in urethral discharge. Thereafter I would give the vaccine once a week, increasing the dose in a way which I calculate is likely to provoke such reactions as the above. The blood is tested after two or three weeks, and if the complement fixation test has not increased in strength I consider it as an indication for changing the vaccine or its method of administration. The search for the badly draining focus can be very tedious, and I doubt if many general practitioners would find it worth while to spend the time which a thorough examination of this kind entails. The first essential is to discover if the trouble is confined to the anterior urethra, and, to determine this, the anterior urethra should be washed out thoroughly before the specimen of urine is taken. If this specimen is perfectly clear and threadless, and the prostatic and vesicular fluids are found to be free from pathological elements, one can concentrate on the anterior urethra with reasonable certainty of discovering the defect. Shrewd palpation of the urethra is valuable as it may disclose abnormal thickenings which can be investigated more thoroughly later with the urethroscope. Naturally a careful search for para-urethral canals is necessary, and the urethroscopic examination must be very searching as some foci can be very small and innocent-looking. When any focus is found I open it with the electric cautery, being afraid of using a knife in auro-urethroscopy because of the risk of air embolus. The opening is followed by systematic dilatation, at intervals of 5 to 7 days, with a Kollmann dilator. If the prostate and/or vesicles are at fault, periodical massage is best supplemented by diathermy applied to this part through the rectum with a suitable electrode, the neutral pad being on the abdominal wall.

In the treatment of gonorrhoea in females similar principles are observed. Drainage is helped by douching the urethra and vagina daily and by insertion into the vagina of a dressing of gauze soaked in glycerine medicated with some mild antiseptic; a yard of gauze folded lengthwise in four is a suitable size for the dressing, and it is paid off into the upper part of the vagina leaving a tag outside for ease of removal next morning. In cases where the patient finds it impossible to attend frequently for treatment on these lines I have found that the application of 10 per cent freshly prepared mercurochrome-220 every 5 to 7 days is very useful. The vagina and cervical canal are first thoroughly cleansed by swabbing and then an urethroscopic swab soaked in the mercurochrome is inserted into the cervix. It is left there whilst the vagina is painted down with mercurochrome and then a fresh swab is inserted into the cervical canal and left there for a few minutes. The patient is instructed to douche daily with a mild antiseptic. The vaccine therapy is on the same principles as in the case of males.

It is impossible in the available space to describe at all adequately the treatment of complications, and I can say only that for abscesses such as peri-urethral or Bartholinian I prefer aspiration followed by injection of electrargol or of 1 per cent mercurochrome to incision. In gonorrhoeal ophthalmia drainage is all important, and on the least doubt about the pus getting away freely I would slit the outer canthus; for the rest, I have relied mainly on hourly douching with boric acid lotion and daily painting of the mucous surfaces of the lids with 2 per cent silver nitrate. Throughout the treatment of gonorrhoea and in tests of cure laboratory aid is indispensable, and in this I would include not only microscopic examination of smears, but cultures and the complement fixation test. The question of employing cultures may be difficult when the worker is far removed from a laboratory. It can be partially

solved by drawing the secretion into a capillary pipette and posting this, after sealing the open end of the capillary. In testing for cure, although we may perhaps be not quite in a position to say that a positive complement fixation reaction some weeks after disappearance of all signs means that the patient is certainly still

harbouring gonococci, such a finding is highly suggestive and calls for a repetition of all the other tests, with provocation designed to unearth buried foci. Naturally a steady diminution in the strength of the reaction after the signs have disappeared is valuable support in concluding that the infection has been eradicated.

Reviews

WILHELM CONRAD RÖNTGEN AND THE EARLY HISTORY OF THE RÖNTGEN RAYS.—By O. Glasser. 1933. John Bale, Sons and Danielsson, Ltd., London. Pp. 494. Illustrated. Price, 32s. 6d.

THERE is probably no single scientific event that has had so profound an influence on the conduct of medical practice as the discovery of Roentgen rays; it is therefore fitting that the full details of the discovery, and of the life and work of the discoverer, should be available for the present generation and be preserved for posterity, so that the name of this great pioneer may be duly honoured now and in the future.

That this great discovery was made during the lives of many of us adds to our interest in the subject and must have facilitated the work of the author of the book under review—though it will have limited his scope for imaginative writing—as he had not to translate ancient papyri nor to dig out and interpret forgotten manuscripts, but only to turn up the scientific journals and daily newspapers of forty years ago in order to obtain his facts. Nevertheless, the propinquity of the event has not prevented a number of fables arising, some of which the author has shown not only originated from very unreliable sources but were scientifically impossible, as for example the story of the Hittorf tube having been placed on a book containing a metal key under which was a photographic plate. The true facts appear to have been as follows:—

Röntgen was experimenting with cathode rays from a Crooke's tube, which had been partially surrounded by cardboard, and probably tin foil; on the table was lying a piece of barium platino-cyanide paper. The paper was lying in the shadow of the light-impervious shield of the tube, and Roentgen noticed that it was nevertheless fluorescent.

It was the fact that he immediately noticed and appreciated the significance of this phenomenon, and not the actual accident of the discovery that distinguished Röntgen from other professors of physics in minor universities and from dilettante experimenters with high-tension apparatus and Crooke's and Hittorf's tubes. He at once proceeded to carry out a series of experiments which proved to himself and to the scientific world that the 'rays' he had by chance discovered were not the previously-known cathode rays, nor any form of light rays, but a new kind of ray with powers of penetration varying according to the density of the substance penetrated.

Few scientific discoveries have so rapidly gripped the imagination alike of the lay, the scientific, and the medical public. The possibility of the production of such rays had no doubt entered the minds of physicists, but to the general public the discovery was so sudden, so surprising, and so complete that within a few days of the first announcement details had been telegraphed all over the world, and for a time the subject formed one of the main topics of conversation in all civilized communities. It cannot be said that the full potentialities of the discovery were at once realized, as since this date the advance in our knowledge of Roentgen rays has been continuous; it has been marked by many triumphs and not a few tragedies; and still we feel there are further possibilities.

Otto Glasser's book is a very satisfactory biography; it tells the story of the life of Wilhelm Conrad

Röntgen, it records all the available details of his outstanding discovery, and it gives one an insight into his character. He was not an easy subject for biography, as with the one brilliant exception there are few high lights in his work, life or character for the artist to use. He appears to have been not an outstanding genius but an industrious, thorough, and conscientious investigator; and in his private life a simple and modest man, and a devoted husband. The letters which are reproduced in the chapter of personal reminiscences certainly give one an insight into his character, but in the reviewer's opinion they do not always indicate the qualities which the writer of this chapter suggests.

It is a book that we can thoroughly recommend.

L. E. N.

A SYSTEM OF CLINICAL MEDICINE.—By T. D. Savill, M.D. (Lond.). Edited by A. Savill, M.D., and E. C. Warner, M.D. Ninth Edition. 1933. Edward Arnold and Co., London. Pp. xxx plus 1063. Illustrated. Price, 28s.

THIS system of clinical medicine has certain features that distinguish it from the ordinary system of medicine. The usual methods of arrangement have not been adopted, for example, according to groups of diseases—acute infectious diseases, etc.—but the subject is approached from the clinical point of view. One cannot perhaps do better than give an example:—Chapter XVI is headed 'General debility, pallor, emaciation'; after introductory remarks two pages are devoted to symptomatology and a summary of the clinical examinations that should be made; then there are twelve pages describing the methods of examination of the blood; these descriptions are clear and concise, and for the most part sufficient to allow the student to undertake the examinations himself—but of course many practical details have had to be omitted—and there is a useful plate showing individual blood cells and blood 'pictures'. (We feel that we must interpolate a criticism here; there is no indication on the plate, or on the descriptive page opposite, as to the stain used; that it is obviously a Romanowsky stain, is no excuse in a textbook meant for students. This fault is a common one in textbooks, but we mention it because it is so easily remedied.) The next section is headed 'Diseases which give rise to general debility . . .'; these are classified according to which is the most prominent symptom—anæmia, loss of flesh, or debility; in the anæmia group, pernicious anæmia comes first; this disease is then dealt with in the orthodox way—under the headings symptoms, diagnosis, prognosis, ætiology, etc. Further down in the anæmia classification, under the sub-heading constitutional conditions, syphilis is given, and later in this chapter syphilis is dealt with fully.

Another chapter is headed 'Pyrexia' and in this the causes of pyrexia are classified and discussed. The system necessitates a considerable amount of cross-referencing, but is on the whole very satisfactory. The writers have placed themselves in the position of the physician faced by a patient with certain symptoms, and have consequently produced a book that will be more practically useful to both the undergraduate and the post-graduate student than the ordinary academically-arranged textbook. The different paragraphs have

been revised and in many cases entirely re-written by experts in the various subjects; Lieut.-Col. Byam and Dr. Hamilton Fairley being responsible for those referring to tropical diseases, consequently the mistakes which so often mar textbooks on general medicine have been avoided; any criticism of these sections would be in connection with omissions and for these the writers cannot be held responsible.

The book should have a special appeal in this country as a textbook of medicine; it is very reasonably priced and is in its way complete. We can strongly recommend it to teachers of medicine as a standard textbook to recommend to students.

MATERNAL MORTALITY AND MORBIDITY.—By J. M. Munro Kerr, M.D., F.R.F.P.S., F.C.O.G. 1933. E. and S. Livingstone, Edinburgh. Pp. xviii plus 382. Illustrated with maps, diagrams, charts, skilograms, and hospital plans. [Obtainable from Messrs. Butterworth and Co. (India), Ltd., Publishers, Calcutta.] Price, Rs. 18-12.

PROFESSOR MUNRO KERR'S treatise on 'Maternal Mortality and Morbidity' contains a vast amount of informative material of first class importance in the solution of the problem. The mass of carefully chosen statistics alone is a very valuable contribution and the book will in consequence be a source of reference for all future students of this difficult subject. The statistics have been carefully examined and the conclusions drawn, deserve to be widely known as they come from the keen and critical mind, of one who has had long experience of midwifery, with and without antenatal care, and of various changes in the management of labour.

The first section of the book is a survey of the causes of maternal mortality and morbidity. It deals not only with the antenatal factors but contains some very enlightening tables showing the results of operative practices, still too prevalent in the management of labour; in other words he clarifies the intranatal factor predisposing to death and disablement. Manual removal of the retained or adherent placenta for instance is shown to be one of the most dangerous of obstetric operations and a more extensive use of saline injection by the umbilical vein is recommended. The emphasis laid on anaemia, trauma, fatigue and prolonged labour as contributory factors to the onset of sepsis throws new light on the subject of infection. The influence exercised by them is ample justification for the use of 'low forceps' as advocated by the author. The necessity for meticulous attention to detail in everything connected with the care of the prospective mother is ably set forth and if only the general practitioner would read for himself the facts, a great improvement in the deaths and disablement from childbirth would result. Unfortunately this section of the book is very largely statistical and unlikely to appeal to many outside the ranks of the obstetric and public health experts.

Another feature is the clear presentation of the differences in death registration in different countries. The figures for countries so closely associated as England and Scotland even, are not strictly comparable because of differences in assessing the predominant cause of death where two are certified; the practice of including deaths from criminal abortion amongst deaths from violence; inclusion of deaths from puerperal albuminuria and convulsions sometimes under eclampsia and sometimes under associated diseases which do not appear in statistics of puerperal deaths.

The picture of untoward events in pregnancy and labour would be incomplete without an outline of the more remote effects of these adverse occurrences. In a chapter entitled maternal morbidity and subsequent disablement, Dr. Donald McIntyre has attempted to assess, from the subsequent health of the mother, the end-results of labour both normal and complicated. The section on neonatal death and disablement by Professor G. B. Fleming correlates disease and death

in early infancy with the normality or otherwise of pregnancy and labour. The picture, if well and truly drawn, is gruesome and one turns with hope to the later sections of the book where measures for the prevention and control of these deaths and disasters are set forth.

Antenatal care is the first line of defence and the figures quoted speak for themselves.

The difference in the death rate between the booked and emergency cases needs no explanation. The variation in the Glasgow and London figures is explained by the adequacy of the antenatal care, in the latter it is 'early and adequate', while in the former it is 'late and casual'. A chapter on intranatal care, the second line of defence, is excellent and extremely practical.

Professor Munro Kerr next turns his attention to the services which must be provided if any reduction is to be effected in the present 'unsatisfactory and undiminishing' level of the mortality graph. The differences in the organization and supervision of domiciliary practice, as conducted by midwives attached to the large maternal hospitals, to smaller maternal hospitals and homes, to nursing institutions, and by midwives practising privately and unattached to any institution, is outlined and the outcome of the differences illustrated. The author deprecates private unattached practice, because it practically precludes the use of a sterilized outfit and sterile dressings at the time of confinement. In the service, as conducted by doctors with the midwife acting as assistant, the mortality rate is higher than when a midwife alone is in attendance. Professor Munro Kerr's observations on the subject are interesting; he states quite clearly that the problem of the abnormal in general practice will not be solved, even by taking the specialist into the home. His considered judgment on the future of domiciliary midwifery is given in the form of a summary to the first chapter of part III.

The institutional midwifery service is treated in the same adequate way; the number of beds is estimated and recommendations on the design, organization, staffing and equipment of the hospital are included. Professor Munro Kerr does not quite see eye to eye with the departmental committee on maternal mortality and morbidity on the subject of the future of antenatal clinics provided by the public health authority, and one is inclined to agree with him rather than to accept the verdict of the departmental committee that the day of the clinic is almost run. Transport and the training of medical students in obstetrics complete the survey.

Section IV, one of the chief objects of the work, namely the co-ordination and co-operation of the several factors which go to the making of a complete maternity scheme is set forth. The scheme outlined appears to cover all essentials and to secure continuity in the care and observation of the expectant mother without undue scrapping of existing institutions.

Professor Munro Kerr says that 'the essential factors prejudicial to betterment are permitted to continue—not because we are ignorant of them but because we have not sufficient determination to remove them'. The essential aim of the author is to point the way of removal. The book is the work of an acknowledged authority, and it is difficult to exaggerate its importance to all serious students of the problem of maternal deaths and disablements.

J. M. O.

PULMONARY TUBERCULOSIS IN GENERAL PRACTICE.—By Andrew Morland, M.D., M.R.C.P. 1933. John Bale, Sons and Danielsson, Ltd., London. Pp. ix plus 113. Price, 2s. 6d.

WE congratulate the author, who is resident physician of the Mundesley Sanatorium in England, for the wealth of material he has been able to include in a pocket-monograph of 113 pages. The book is divided into two sections—(I) General, dealing with the pathology, symptoms, signs and diagnosis of lung

tuberculosis, and (II) Treatment, which includes general, symptomatic, surgical and special methods. The views expressed by him are remarkably up to date and correct. More space has justifiably been given to information which is likely to be useful to the general practitioner who comes, as he says, from 'the most important branch of the profession dealing with the individual tuberculosis patient'. The importance of 'after-care' has been acknowledged by devoting a separate chapter to the subject. It is interesting to note that he does not admit the superiority of outdoor occupations connected with farming and gardening, over sedentary office work. There is a good deal of strength in his arguments though some may not agree with him. The importance of studying and dealing with the mental aspect of the patient has been emphasized by writing a separate chapter on the subject. A commendable boldness has been shown in expressing his opinions which, we hope, will be very useful not only to general practitioners but to specialists as well. There are a few printing mistakes which, we hope, will be corrected in the next edition.

A. C. U.

AIDS TO PUBLIC HEALTH.—By W. G. Altchison Robertson, M.D., D.Sc., D.Litt., F.R.C.P.E. Third Edition. 1933. Baillière, Tindall and Cox, London. Pp. viii plus 208. Price, 3s. 6d.

THIS small book is more in the nature of an index with short definitions of matters relating to public health. It may be of use to students going up for public health examinations. The information given is of necessity meagre, and so far as tropical medicine is concerned not entirely correct. Thus under plague it is stated that 'human beings with plague in turn infect *Pulex irritans*, bugs and lice, and so the disease spreads rapidly'. This is a statement not generally acceded to by students of plague. Under malaria also, the suggestion is made that Paris green acts by forming a film on the surface and cuts off the supply of air from the larvæ. Students in India may find it useful for a quick run over but it is not particularly suited for India or tropical needs.

A. D. S.

WORKMEN'S COMPENSATION: ITS MEDICAL ASPECT.—By Sir John Collie, C.M.G., D.L., M.D., J.P., Lieut.-Col., R.A.M.C. 1933. Edward Arnold and Co., London. Pp. vii plus 160. Price, 7s. 6d.

THE compensation of workmen for 'accident' during the course or as a result of occupation is thirty-six years old in England. Like many other enactments of this nature, its apparent initial simplicity is a delusion, and some of the legal, medico-legal, and medical aspects are vague and indeterminate. The words 'by accident' occur in various sections of the Act, but are nowhere defined. It required ultimate appeal to the House of Lords to decide whether rupture occurring to a workman in the course of his duty was 'an accident' in the meaning of the Act. On the other hand mental derangement and suicide have been held to be 'accidents' in the sense of the Act.

In England, medical practitioners, under the National Insurance Act and the Workmen's Compensation Act, may have important relations with their industrial patients and upon their judgment may depend very important issues. Sir John Collie has had a large experience both as medical adviser, consultant and referee in workmen's compensation cases. He gives excellent and detailed advice how to approach such cases and how to conduct their medical examination. In various chapters he discusses the common diseases and disabilities which are the result of accident, and shows how to apportion these diseases to their proper causes, both ordinary and occupational. He has excellent advice for the medical men who willingly or unwillingly may be called on to give evidence in the witness box in workmen's cases. There is a Workmen's Compensation Act in India, but owing to the nature

of the law the ordinary medical practitioner here does not come into such close contact with these cases as in England. Nevertheless, the book will be found of very great interest and is one to be kept in mind for reference by the specialist and the practitioners here who may be called upon to deal with such cases of 'accident'. The book is written very interestingly and there should be a copy in every reference medical library.

A. D. S.

A LABORATORY MANUAL OF PHYSIOLOGICAL CHEMISTRY.—By W. Wright Willson. Second Edition. 1932. The Williams and Wilkins Company, Baltimore. Pp. 284. Price, 12s. 6d. (Agents are: Messrs. Baillière, Tindall and Cox, London—The book is available from them.)

THIS is the revised second edition of the book originally written in joint authorship with Prof. Walter Jones and is chiefly intended as a guide to the students for laboratory work.

As before, the book is divided into two portions, part I, dealing with general chemistry, inorganic and organic, and part II, dealing with body tissues and fluids, including in it, several sections on quantitative analysis of gastric juice, blood, urine, etc.

We are pleased to find that the suggestion we made in our review of the last edition for including an alphabetical index has been accepted by the author and this, we feel sure, will be a great help to the reader.

The book, we have no doubt, will prove to be a useful aid to students in their laboratory work and we would recommend it to them as such.

J. P. B.

THE QUEEN CHARLOTTE'S TEXTBOOK OF OBSTETRICS.—By Alick W. Bourne, Trevor B. Davies, L. Carnac Rivett, L. G. Phillips, G. S. Lane-Roberts, and Leslie H. Williams. Third Edition. J. and A. Churchill, London. Pp. 679, with 301 text figures and 4 coloured plates. Price, 18s.

SINCE its first appearance under a slightly different title in 1927 this book has earned great popularity and a third edition has now appeared. It is written by a team of six members of the staff of Queen Charlotte's Maternity Hospital, and has all the advantages, in the form of authoritative treatment of each branch of the subject, and some of the disadvantages, in the form of slight inco-ordination and lack of balance, of this method of compilation. The layout of the book follows usual lines, successive sections dealing with development and anatomy, pregnancy—normal and abnormal, labour—normal and abnormal, the puerperium—normal and abnormal, obstetric operations, the baby, and miscellaneous subjects. The addition to Queen Charlotte's Hospital of a new isolation block for the treatment of puerperal sepsis has afforded the authors a wealth of experience in the diagnosis and treatment of the conditions grouped under this heading which has been incorporated in the book and makes this section the best survey of puerperal sepsis which we have seen in a textbook. Other welcome points are a full description of Kielland's forceps and an account of the Zondek-Aschheim test for pregnancy.

The chief causes of maternal and early infantile mortality amongst the uneducated masses of India which worry the practitioner are probably anaemia, either exaggerated by or secondary to pregnancy, premature birth, due to anaemia or malaria or a combination of the two, and puerperal sepsis, due to incompetent midwifery by untrained *dhais*, and the effect of anaemia and malaria on maternal resistance. Of these, anaemia has not yet earned its rightful place in textbooks of midwifery as an important, or in India as the most important, disorder associated with pregnancy, and is not mentioned in this book. Recent work has stimulated

interest in this subject and we look forward to a future edition in which it will be given a detailed treatment such as is now given to the toxemias of pregnancy. The management of premature infants is described, though not as fully as the practitioner in India would appreciate. For the chapter on puerperal sepsis we have nothing but untinged praise.

As is inevitable in a compilation by several authors there is some overlapping. Pyelitis is essentially the same disease whether it occurs in pregnancy or the puerperium, but it is here dealt with in three sections of the book; again on page 175 the reader is referred to 'works on medicine' for details of the ketogenic diet in the treatment of this condition, whereas a full description of the rationale of the diet, with diet tables for a week, is given on page 469. While we also agree that a detailed survey of the methods of anaesthesia applicable to obstetrics would require a very long chapter, and that the subject therefore requires condensation, yet we consider that this subject deserves considerably more space than does the vaccination of infants, which receives practically the same. There points, however, are but minor blemishes on an

excellent book which should maintain its place in the first rank of textbooks on midwifery.

G. M.

OTHER BOOKS RECEIVED

First Aid Catechism. By P. K. Kurup, L.C.P.S. (Bom.), L.M.P. (Mad.), D.Opt. (Lahore). First Edition. 1932. Printed at the Sree Krishna Vilasam Press, Taliparamba, Malabar.

Sex Efficiency through Exercises: Special Physical Culture for Women. By Th. H. Van de Velde, M.B. 1933. William Heinemann (Medical Books), Ltd., London. Price, 25s.

What the Diabetic needs to know about Diet. (By a Science Graduate.) Published by John Bale, Sons and Danielsson, Ltd., London. 1933. Price, 2s.

Lippincott's Quick Reference Book for Nurses. By H. Young, R.N. With the assistance of G. A. Morrison, R.N., and M. Eliot, R.N. 1933. J. B. Lippincott Company, Philadelphia and London. Price, 9s. [Obtainable from Messrs. Butterworth and Co. (India), Ltd., Calcutta.] Price, Rs. 6-12.

Abstracts from Reports

ABSTRACTED FROM AN ENQUIRY INTO CERTAIN PUBLIC HEALTH ASPECTS OF VILLAGE LIFE IN INDIA BY MAJOR-GENERAL SIR JOHN MEGAW, K.C.I.E., K.U.P. I.M.S., DIRECTOR-GENERAL, INDIAN MEDICAL SERVICE (1933)

(The views expressed below are purely personal)

THE report deals with an attempt to make a broad survey of certain aspects of village life which have a bearing on the health of the people. The word survey is hardly appropriate, some of the conditions which are dealt with are constantly changing and some are so elusive that it is only possible to obtain vague impressions of their real nature. Provided that these limitations are fully recognized I think the data which have been collected are of considerable value in defining the problem which has to be tackled by medical and public health workers in India.

The information was obtained by the issue of a questionnaire to a large number of doctors whose dispensaries are situated in typical agricultural villages scattered throughout British India. Every effort was made to ensure that the replies to the list of questions should be unbiased and that they should also be the result of personal enquiries by the doctors. It was found that a good many of the sets of replies had to be rejected because they showed inherent evidence of unreliability. The remaining 571 replies constitute a fairly large supply of random samples from which it is possible to form a general idea of what is really happening in the villages. No claim is made for the correctness of every detail of the data and I hope that those who are impatient with inaccurate statistics will regard the figures as a challenge to them to obtain more reliable information. In the case of several of the items this survey represents the first attempt which has been made to find out the facts.

COMMENTS ON THE FIGURES

Average size of families

The average number of members of each family in the agricultural villages varies from 5 in the Central Provinces and Madras to 6.4 in the Punjab; in all the other provinces it ranges from 5.2 to 5.78, the average for the whole of India being just under 5.5.

Average area of land cultivated

The average area of land per head of the agricultural population ranges from 1.45 bighas in Bengal to 5.27 in the Central Provinces (0.72 to 2.63 acres), but of course

the yield of crops in different parts of the country varies so greatly that the actual area of land which is cultivated conveys little information as to the real income of each family.

Physical condition of the villagers

The figures which deal with the state of nutrition of the villagers are frankly impressionistic but they are not likely to convey an exaggerated idea of the number of people who are poorly or badly nourished; the village doctors are unlikely to have adopted a high scale of standards in this matter and it is probable that the figures would have been even more unfavourable if European doctors had made the estimates. Taking India as a whole the dispensary doctors regard 39 per cent of the people as being well nourished, 41 per cent poorly nourished and 20 per cent as very badly nourished. The most depressing picture is painted by the doctors of Bengal who regard only 22 per cent of the people of the province as being well nourished while 31 per cent are considered to be very badly nourished. It is impossible to express any dogmatic opinion as to the relative influence of insufficient diet and disease on the physical condition of the villagers but it is obvious that diet must play a very important part.

Diet

Enquiries were made as to the average quantities of each important article of diet consumed daily by adults, but the figures were found to be incapable of satisfactory analysis and therefore they have not been included in the tables. There was, on the whole, less evidence than might have been expected of actual shortage of food: in most of the villages three meals a day are said to be more common than two and the quantity of food consumed is usually sufficient to satisfy hunger. Although there are a fair number of reports of insufficiency of food it is the quality of the diet that is at fault rather than the quantity; animal proteins in the form of meat or milk are taken in very small quantities; fruits and vegetables are seriously insufficient in most villages at certain seasons of the year. The amount of milk which is consumed is surprisingly small except in the Punjab where the average works out at 10 ounces daily for each adult. In the U.P. it is 5 ounces, in Bombay 4 ounces and in the other provinces 3 ounces or less. Ghee is consumed in negligible quantities of one-tenth to a third of an ounce except in the Punjab where it is rather over one ounce and the U.P. where it is reported as being just over half an ounce. As

ghive is a very overrated source of vitamins, its shortage is of much less importance than that of fresh milk. Without claiming any great degree of accuracy for the evidence which relates to the diets, the data correspond fairly closely with the impressions of those who have interested themselves in the matter: it is evident that the supply of available proteins, fats and some of the vitamins is seriously inadequate except in a few favoured localities.

The information supplied by the village doctors on the subject of diets is entirely in keeping with the results of the investigations made by Colonel McCay, I.M.S., about 20 years ago in Bengal. Colonel McCay and other observers have found that the Indian school-boy shows a much lower gain in weight than boys of corresponding ages in Europe and they ascribe the difference to the unsuitability of the Indian diets, especially to their deficiency in the body-building proteins.

Alcohol

The information with regard to alcohol suggests that very little is consumed by the average villager. The percentage of the people who take alcohol at all works out at 12.3 for the whole of India. Here again it would be unsafe to attach very great importance to the actual figures but it is obvious that, with the possible exceptions of Assam, Bihar and Orissa and Madras, alcohol does not play an important part in the life of the community as a whole.

Population and food supply

In nearly 40 per cent of the villages it is considered that the population is excessive in relation to the available food supply. In Bihar and Orissa nearly 60 per cent of the villages are said to be over-populated: in Bengal and the Punjab the percentage is about 46. The figures which deal with this question have no statistical value: they merely represent the impressions formed by dispensary doctors whose replies are based on their personal views as to what constitutes a reasonable standard of existence. It is likely that most of the medical men who were engaged in making the survey would be prepared to accept rather low economic standards of life as being adequate for the villages: indeed in many cases in which the food supply was stated to be sufficient there was plenty of evidence in the replies to other questions that this was far from being the case.

Disease incidence in the villages

As is the case with most of the other statistics which are given in the tables the figures of diseases prevalent must be accepted with great reserve. Few of the doctors are in so close touch with the villagers that they can give reliable information with regard to the incidence of each of the diseases which are dealt with. In the cases in which it is possible to check the data against other sources of information it is found that there are many discrepancies in details, but the averages for the whole of India correspond fairly closely. It may therefore be claimed that the figures give a fairly good general idea of the prevalence of certain diseases. In the case of other diseases such as rickets, syphilis, gonorrhoea and tuberculosis nothing short of a detailed survey by trained observers could be relied on to supply accurate data. On the basis of the figures which are available the approximate total number of cases of the following diseases among the whole population of 353 millions would be—

	Millions
Rickets	2½
Night-blindness	3½
Syphilis	5½
Gonorrhoea	7½
Leprosy	4
Tuberculosis of the lungs	1½
Other forms of tuberculosis	5
Insanity	4
Congenital mental defect	3
Blindness	2

Rickets.—Rickets, a disease caused by a deficiency in the diet, appears to be very much more prevalent in Bengal than elsewhere and least common in Assam and the Punjab.

Night-blindness.—This is caused by a different kind of dietetic deficiency: it is reported as being excessively common in the United Provinces and rather uniformly distributed throughout the rest of India except Bombay which is remarkably free from the disease. Here again no inference can be drawn except that two forms of dietetic deficiency are comparatively common in India as a whole.

Syphilis and gonorrhoea.—Appear to be more common than has been usually believed; Bengal and Madras easily head the list. The data suggest that something like 5½ millions of people in India actually show signs of syphilis so that if account be taken of those who have had the disease and have lost all obvious signs, it would probably be well within the mark to assume that 10 to 15 per cent of the inhabitants suffer from syphilis at some time or other during their lifetime. The strikingly low rates of venereal disease in the Punjab are entirely in keeping with impressions based on other sources of information.

Leprosy.—The estimate of 750,000 cases of leprosy in India corresponds fairly closely with the opinions which are based on surveys by experts: it is probably on the low side although it is far higher than the census figures.

Tuberculosis.—Tuberculosis is evidently very widespread throughout the villages of India but is specially serious in Bengal, Madras, the Punjab and Bihar and Orissa. Pulmonary tuberculosis seems to be much more common than extra-pulmonary except in the United Provinces and Bombay. The low incidence in the Central Provinces is remarkable and is perhaps associated with the sparse distribution of the population and with defective means of communication.

Tuberculosis is well known to be exceedingly prevalent in the cities and large towns but little is known as to its incidence in rural areas. The evidence of the dispensary doctors goes to show that the disease is very widely disseminated throughout India. From other sources of information it seems likely that the disease is increasing steadily and rather rapidly. The estimate of just over two million cases of tuberculosis in India as a whole is probably much too low; every large town is known to be very heavily infected, and therefore an estimate which is based solely on the incidence of the disease in the agricultural villages must be unduly favourable.

Tuberculosis is a disease which has very special importance in India for the reasons—(1) it is likely that many villagers have never come in contact with infection and therefore are 'virgin soil' on which the disease is likely to thrive, (2) the infection is being steadily spread from the large towns to the villages, (3) the disease constitutes a reliable index of the standards of life which prevail in countries in which it has become established for long periods of time; it spreads rapidly among ill-nourished and badly housed populations and correspondingly diminishes when the people are well fed, well housed and cleanly in their habits.

Insanity and congenital mental defect.—The figures for insanity and mental deficiency taken together show that these diseases are less common than in western countries, viz, 1.7 per mille against 4 per mille in the United Kingdom. Assam and Bengal show fairly high figures of about 3 per mille. The census figures show only 0.3 per mille cases of insanity; they do not include mental deficiency, but even when allowance is made for this it is evident that the census estimate is much too low and that the present survey is likely to give a much more accurate picture of the true state of affairs.

Blindness.—If the figures given in the survey are accepted as being representative there would be 5.5 cases per mille in India against only 1.5 per mille reported by the official census for 1921. The census figures are

certainly unreliable; in every case in which they have been checked by a detailed investigation they have been found to be far too low. For example in the Nask district it was found that there were thrice as many blind as were shown by the census and in other places similar results were obtained by a careful investigation. It is therefore probable that there are nearly two million blind persons in India though some of these may not be totally blind.

The information which deals with the causes of blindness is rather vague; among 2,750 cases of blindness the causes were stated in 1,620 and were as follows:—cataract 618, glaucoma 258, smallpox 256, trachoma 218, interference by quacks 90, ophthalmia neonatorum 85, conjunctivitis 51, and born blind 44. In the remaining 1,130 cases the causes were not stated. It is surprising that keratomalacia is not mentioned, as this is regarded as an important cause of blindness in southern India. Here again a detailed and accurate survey is badly needed.

Cholera, plague and smallpox.—The chief interest of the figures which deal with these diseases is that they serve as controls for the general reliability of the rest of the information obtained by the enquiry.

The following comparison is of interest in this respect:—

	Survey figures. Yearly averages for 1927-1931.	Official figures for British India. Yearly averages for 1927-1931.
Cholera	.. 260,000	301,936
Plague	.. 31,290	61,600
Smallpox	.. 81,000	79,091

Making due allowance for the errors associated with random sampling it is evident that if the survey were our only source of information as to the prevalence of these diseases the broad general impression would not be seriously misleading. In the case of plague the yearly variations are very great, for example, in 1929 there were 72,489 deaths and in 1930 only 21,841 so that the estimate formed from the survey falls well within the range of yearly variation though it is considerably lower than the average of the past five years. The comparative accuracy of the figures for cholera and smallpox does not justify any claim that the estimates of frequency of such diseases as rickets, syphilis, gonorrhoea, leprosy or tuberculosis are likely to be equally reliable; difficulty of diagnosis, concealment of the diseases and other factors combine to confuse the picture. It is universally recognized that the registration of cases of cholera, plague and smallpox is much more accurate than that of other diseases which are less striking in their manifestations.

Enlargement of the spleen (malaria).—For all practical purposes enlargement of the spleen means malaria except in the localities where kala-azar is common. The cases of enlarged spleen which are due to kala-azar and all other causes are not sufficiently numerous to affect the figures to any serious extent. The incidence of 14.3 per cent of enlarged spleens gives a fairly good idea of the prevalence of malaria, though a more comprehensive and accurate survey is much to be desired. From the figures it appears that the number of persons who suffer every year from malaria in India is not less than 50 millions, and may easily exceed 100 millions in some years.

Age at which cohabitation and child-bearing begin

The figures showing the average ages at which girls begin to cohabit with their husbands and give birth to their first child are the most important and significant of the whole series. In the ordinary course of events girls begin to cohabit at the age of about 14 years and have their first baby at 16. The remarkable uniformity of the estimates of the ages of cohabitation and first pregnancy shows that these figures can be accepted as being reasonably accurate: they indicate that the normal custom is to impose the cares and dangers of motherhood on immature girls at an age when they ought to

be attending school. Considering the early age at which child-bearing begins the average number of children born to each mother is lower than would be expected; it is probable that the young mothers usually become worn out and incapable of having children before they reach the age of 30. The figures showing the average duration of lactation are in accordance with the prevailing impressions on the subject. The prolonged period of lactation imposes a very heavy strain on the vitality of the young mothers.

Conclusions

Taking the results of the collective enquiry as a whole and making the most liberal allowance for error the resultant picture is gloomy to a degree. From the survey and other sources of information it is certain that (1) India has a poorly nourished population, (2) the average span of life is less than half of what it might be, (3) periods of famine or scarcity of food have been occurring in one village out of every five during a ten-year period in which there has been no exceptional failure of the rains, (4) in spite of the excessively high death rate the population is increasing much more rapidly than the output of food and other commodities, (5) young girls who ought to be still at school are forced to become wives and mothers, many of them are doomed to die in child-bearing, (6) epidemics of cholera, plague, and smallpox are commonplace occurrences. Malaria is constantly present throughout the greater part of India, (7) worst of all, there is little evidence that the educated classes of the community have realized the full gravity of the situation: at any rate they have made no constructive proposals for investigating the problem or for working out a plan for its solution.

The history of the past century is that the Government of India has constructed canals, railways and roads, it has provided security of life and property, promoted education, medical relief, improvements in agriculture and industries and instituted measures of public health. The net result is that more than 350 millions of people are living in a better economic condition than was the case when the population was only 250 millions. This is the bright side of the picture but the present situation does not justify a complacent attitude. It is clear that the growth of population has already begun to outstrip the increase in the production of the necessities of life so that even the existing low standards of economic life must inevitably become still lower unless some radical change is brought about. The outlook for the future is gloomy to a degree, not only for the masses of the people who must face an intensified struggle for bare subsistence, but also for the upper classes whose incomes depend on the production of a surplus of crops and other commodities. If the entire produce of the soil is needed to provide for the urgent needs of the cultivators nothing will be left for the payment of rents or revenue, nothing to exchange for other commodities or even for the purchase of railway tickets and the whole social structure of India must inevitably be rudely shaken if not completely destroyed.

The first step should be to make an accurate survey of the present position and a reliable forecast for the future. When this has been done it is certain that the educated sections of the community will be awakened to the necessity for immediate and concerted action if the country is to be saved from disaster. Energetic measures for the prevention of disease are obviously necessary, but these cannot save the situation unless they are accompanied by equally energetic measures for the education of the masses in the principles of life planning. Other peoples have achieved a considerable degree of success in gaining a mastery over their environment and there is no reason why the people of India should not gain a similar or even greater success provided that the problem is tackled in an intelligent manner.

It is easy to point to the present economic crisis in Europe and America and to suggest that this implies the failure of civilization, but it is possible to profit by the failures as well as the successes of others. It is by no means desirable to imitate the example of western countries in a slavish manner: what is needed is that we should work out a policy which is suited to the special needs and conditions of India, and there is *prima facie* evidence that the formation of such a policy is a matter of very great urgency.

ABSTRACT OF THE REPORT OF THE SESSION OF THE OFFICE INTERNATIONAL D'HYGIENE PUBLIQUE HELD IN PARIS, 1ST TO 10TH MAY, 1933. BY LIEUTENANT-COLONEL A. D. STEWART, I.M.S., DIRECTOR, ALL-INDIA INSTITUTE OF HYGIENE AND PUBLIC HEALTH, AND DELEGATE FOR THE GOVERNMENT OF INDIA

As Major-General Graham, Public Health Commissioner with the Government of India, was unable to visit the May meeting of the Session, the Government of India deputed Lieutenant-Colonel Stewart as its delegate. It will be remembered that the Office International d'Hygiene Publique represents the permanent location in Paris of the International Sanitary Convention to which most of the countries of the world are signatory. The object of the convention is to have an international agreement concerning the carriage of disease throughout the world, and particularly to agree on the maximum action that can be taken by one signatory country against another in respect of shipping coming from infected or possibly infected ports of the latter. The convention also deals with the important Haj pilgrimage to Mecca and other neighbouring holy places, and with the sanitary conditions and control of these pilgrimages. The permanent committee of the office meets twice a year in Paris, in May and October, and consists of official delegates from all signatory countries. At these meetings, the permanent committee deals with important matters concerning and relating to the convention, and also with the progress of international knowledge appertaining to infectious and other diseases, particularly to their causation, mode of spread, epidemiology and prevention. The office issues a monthly bulletin which contains many important reports and articles. Owing to this being printed only in French, however, these articles do not obtain the wide circulation and publicity which their quality and importance deserve. The President, Sir George Buchanan, hopes that an English edition of the bulletin may soon be forthcoming. The principal subjects dealt with by the office are cholera, plague, yellow fever, and smallpox—diseases in which India is particularly interested and indeed vitally concerned. India's representation at the biannual meetings of the permanent committee is thus important. For the last 5 years, Major-General J. D. Graham, Public Health Commissioner with the Government of India, has represented the Government of India at the office meetings and his presentation of the work done in India, and the difficulties that confront India in public health progress have led not only to a more sympathetic appreciation and understanding of what may sometimes be thought to be the slow advance of public health in India, but to a very much wider and more generous appreciation of the vast amount of valuable work that has been accomplished in India in pioneer research on tropical disease, and actually in its application. It is thus important that India should have continuous and adequate representation at the meetings of the office.

At the May meeting several matters of interest and importance to India were discussed. Chief amongst these were the questions of (a) the possibility of preparing an 'omnibus' type of agglutinating serum for the cholera vibrio, agglutination with which could be accepted an authentic diagnosis of cholera vibrio, and (b) the vexed question of cholera carriers. Since

the discovery of the El Tor vibrio, and of vibrios of a non-agglutinating character in the stools of the residents in or coming from areas affected either endemically or epidemically with cholera, there has been a great controversy over the question of carriers, and indeed great difficulty both in assessing the correct inferences that should be drawn from finding such atypical vibrios in the stools of contacts, pilgrims and immigrants and travellers, and in deciding the action which it is justifiable to take in such cases. The question was further complicated last year by the finding in Syria and Egypt of agglutinating vibrios in travellers coming from Iraq, not only from neighbourhoods affected with cholera, but from areas absolutely free from cholera. To study these problems the office appointed a cholera committee or commission. They entrusted Dr. Madsen and Dr. Cantacuzene with the preparation of anti-sera; and the vibrios used should satisfy certain strict conditions. Such sera are now being tested in India and elsewhere and the results should be available shortly. On the vexed questions of carriers, Dr. Convy was asked to prepare a statement on the whole question. His paper which was presented to the May meeting is a very complete record of all the work that has been done and all the views that have been held on the cholera carrier question. Indian experience has been at variance with that of workers in Syria and Egypt. Agglutinating healthy carriers have never been found in India, except in one or two isolated and rather unique instances such as that reported by Grieg in 1913. We recommend our readers to read Dr. Convy's report which will be published in the monthly bulletin of the office. In the discussion on these subjects, the valuable work that had already been done in India was noted, and it was realized that only in India could work on cholera be satisfactorily carried out and the meeting of the office passed a resolution to the effect that it hoped it would be found possible for the Government of India to form a specific inquiry or commission on cholera, which would embrace the subjects of the preparation of specific anti-sera and the carrier question. A great deal of interesting work on cholera is at present being done on cholera both under the auspices of the Indian Research Fund Association and by the School of Tropical Medicine, and the subject is one which will probably be fully discussed at the research workers' conference at Calcutta in November and December.

The subject of plague, and the disinfection and deratization of ships was another subject of importance to India discussed. The International Sanitary Convention of 1926 only permits of one deratization at the expense of the ship and suggests that only under very exceptional circumstances should two fumigations be carried out. It is now realized that special circumstances may exist rendering a preliminary fumigation with loaded holds necessary, followed by a second fumigation after or during discharge, if plague or live rats are found after the first fumigation. An amendment to make this point clear has been proposed and will be forwarded to signatory countries. Interesting papers on the procedure and standards for fumigation by SO₂ were submitted and have been published in the bulletin.

Readers will remember that the Government of India insisted on such an interpretation of the new International Aerial Traffic Convention, that it should reserve the right of prohibition of air traffic coming from countries infected with yellow fever, for reasons which it might itself deem sufficient. The new aerial convention with this interpretation has now been drafted and is ready for signature by the various countries, indeed it has already been signed by several. An interesting communication was given by Dr. Findlay on the methods of immunization against yellow fever by methods based on those of the Rockefeller workers. A variety of other subjects were discussed at the May session and the salient features of these have been summarized by Colonel Stewart in his report. In summing up his impressions of the meeting, Colonel

Stewart states 'The research work in India is highly appreciated, but I gathered that in the field of everyday sanitation, there is an impression that not enough headway is being made, though the difficulties in the path of progress in this direction are understood'.

Everyone interested in research and medicine and public health work in India owes a great deal to Major-General Graham who will soon retire from the post of Public Health Commissioner with the Government of India. General Graham has been successful in presenting the position and the work done in India at the office for many years and his services in this connection will be very much missed.

ABSTRACT OF THE ANNUAL REPORT OF THE EXECUTIVE HEALTH OFFICER OF THE CITY OF BOMBAY, 1932

The Health Reports of Indian towns are always of interest. Advancement in environmental sanitation, water supplies, and drainage, for instance, should be possible in towns where collective funds and administrative and executive staff are available. The progress made annually in this direction in Indian cities and towns is usually disappointing. This year's report on Bombay is more hopeful. We draw attention to some of the more interesting points.

The population according to the 1931 census was 1,161,383. This was a 1.23 per cent decrease in place of a 20 per cent increase during the decade of 1911-20. The 1931 census figure was the result of trade and other depression in the city at the time of the census operations and is not a permanent loss to the city population. The death rate for 1932 was 19.7 per 1,000—the lowest for the last 50 years. This is an uncorrected rate but it is unlikely that there has been much of a decrease of numbers in the poorer classes, amongst whom the death rate is ordinarily high. It is likely that the year 1932 was a healthy one. When we turn to the mortality, we find that the mortality from cholera, smallpox, and plague was practically nil. There was also little or no mortality from influenza. The mortality in 1932 therefore represented what is normally happening in the absence of epidemic disease. Turning to the causes of death, we find that the only considerable mortalities are those due to respiratory diseases (excluding tuberculosis), congenital debility and diseases of early infancy, malaria, and tuberculosis. The deaths from respiratory diseases require further investigation. Tuberculosis causes 12 deaths per 1,000—not by any means as high as in many other towns in India and in other oriental towns. There are 2 tuberculosis dispensaries and a sanatorium with 32 beds. Advanced cases of phthisis are taken into the Maratha Hospital, where there are 80 beds for this purpose.

The chapter on malaria is always interesting in view of the reports of Bentley and Covell. Mahim and Worli wards show spleen rates of 22 and 23, the Market ward one of over 10. The other wards vary from 1.3 to 5. Work on filling in wells, mosquito proofing and closure of wells is progressing. Houses and buildings are systematically inspected for constructive and other defects leading to mosquito breeding and are dealt with summarily.

The birth rate was 24.8 per 1,000. This is almost certainly an under-estimation. The season of lowest birth rate is in the central months of the year, the highest rate occurring in November, December and January. (The mortality, on the other hand, hardly varied from month to month in 1932, though it was lowest in June and July.) During the last 5 years there has been a remarkable fall in the infant mortality rate; the 1932 rate was 218, and cutting out certain deaths in unregistered births the figure would be 191. We have on previous occasions commented on the well-organized maternity- and child-welfare work in Bombay. Municipal district nurses do excellent work in the houses and there are now 5 maternity homes maintained by the municipality.

With regard to the general sanitary state of the city, the city as a whole is now supplied with an adequate quantity of pure water from Lake Tansa. The whole supply is chlorinated, but there is no filtration.

The drainage and sewage problem does not seem to have progressed much since last year. Some new sewers are being constructed, to be used when the location of the outfall has been decided. In the meantime, the situation has been much aggravated by the increased water supply and the erection of new buildings.

The basket privies, well known as disgusting nuisances to all who have ever entered the back lanes of Bombay, are gradually but surely being reduced in number and replaced by water closets. During 1932, 2,651 privy seats were converted; the number of seats remaining to be converted in the sewered areas is about 12,000.

Housing.—Houses are regularly inspected and defects remedied under the various sections of the Municipal Act.

The appendix to the Report contains the Report on the Arthur Road Hospital for Infectious Diseases, the Maratha Hospital, the Municipal Laboratory and the Superintendent of Vaccination.

ABSTRACT OF THE QUARTERLY REPORT OF THE MYSORE DEPARTMENT OF PUBLIC HEALTH, NOS. IV AND V, FROM OCTOBER 1932 TO MARCH 1933

These reports give a running comment on the work carried out in Mysore State every quarter. They are therefore mainly statements of numbers and figures of various kinds, and résumés of progress in certain works. Malaria surveys are being carried out in various parts of the State. Water supplies and conservancy systems are being improved. The construction of bored-hole latrines seems to be progressing very favourably. We read that during the last Mysore Teachers' Conference held at the national high school, Bangalore, 6 bored-hole latrines were put up for the use of the delegates—good educational propaganda. An opinion after a few years' working on this form of latrine would be informative, as many claims have been put forward for its being the solution of village conservancy. These reports should be very useful to the various organizations in Mysore State and we trust they are well distributed and read.

ABSTRACT OF THE REPORT ON THE BURMA FOOD AND DRUGS ACT, 1928, WITH RECOMMENDATIONS FOR FOOD STANDARDS. BY EDWIN H. BUNCE, F.I.C., F.C.S., PUBLIC ANALYST TO THE GOVERNMENT OF BURMA

The Government of Burma in 1928 passed a Food and Drugs Act, which however could not be put into action until rules laying down standards and definitions were passed and until a public analyst or analysts were appointed. Mr. Bunce was appointed public analyst in 1930 and has since his appointment assiduously worked at analysing food-stuffs in Burma. Sufficient has now been done in this direction to enable Mr. Bunce to recommend food standards for official adoption and at the same time to recommend some amendments to the Act passed by the Burma Legislature in 1928. The report will be found of considerable interest to other provinces in India, both to those which have already passed food adulteration acts and drawn up food standards and to others which have one or other of these actions under contemplation.

Mr. Bunce favours English procedure, whereby general definitions only are given, and it is left to the public analyst to report to the court whether a substance is genuine or not; in the latter case giving the nature of the adulteration, and the percentage of foreign substances present. There is much to be said for this view as, when definite standards are laid down, samples may be found showing unquestionable adulteration, but which nevertheless conform to the

limits of the official standards. In such cases complications arise and the presence of the analyst would be necessary in court in order to explain such an apparent discrepancy.

The following are the conclusions and recommendations for standards in Burma arrived at by Mr. Bunce.

Cow's milk.—This should not contain less than 3.0 per cent of milk fat, or less than 8.5 per cent of milk solids other than fat.

Buffalo's milk.—5.0 per cent milk fat and 9.0 per cent non-fatty solids are the figures recommended. In most Indian provinces 3.5 and 6 per cent of fat are the figures for cow's and buffalo's milk.

Condensed milk.—The English Regulations of forms and schedules are followed in Mr. Bunce's recommendations.

His figures are as follows:—

Condensed milk	Percentage of milk fat	Percentage of total solids
1. Full cream, unsweetened	9.0	31.0
2. Full cream, sweetened ..	9.0	31.0
3. Skimmed, sweetened .. ..	..	26.0

These are minimal percentages.

Dried milk.—Mr. Bunce wisely recommended having only 1 description, viz, Dried Full Cream Milk. It should contain not less than 26 per cent of milk fat.

Ghi.—No differentiation is made between cow and buffalo and mixed ghi. The standards for ghi are:—

Reichert-Wolly figure minimum of 24.

Butyro-refractometer reading between 40° and 43° at 40°C. Butter a maximal limit of 16 per cent of water is recommended. No standards (wisely, we think) are suggested for the various edible oils.

Tea, coffee, and chicory are defined only in general terms for the reasons already given.

An appendix gives the result of Mr. Bunce's analytical result in respect of milk and butter. The report should be read by all public analysts in India and by those assisting in preparing draft food adulteration acts and rules.

ABSTRACT OF THE THIRTEENTH ANNUAL REPORT OF THE BLIND RELIEF ASSOCIATION, BIJAPUR, 1932

THE twelfth annual report of this organization was noted in our issue of February last, and the report under review is a record of another year of useful work throughout ten areas of Bijapur district and Akalkot State, but work in three other neighbouring states had to be discontinued on account of lack of funds mainly caused by the cessation of grants to the association from these three States.

Copies of this report and information regarding the association can be obtained from the Civil Surgeon, Bijapur, who is its chairman. Donations towards the association's funds may also be sent to the same address.

ABSTRACT OF THE ANNUAL REPORT, 1932, OF THE SUDAN MEDICAL SERVICE

THE Sudan must almost be unique in tropical provinces in that it contains practically every known tropical disease except cholera. Malaria, black-water fever, bilharziasis, guinea-worm, hydatid disease, kala-azar, leprosy, sleeping sickness, yaws, relapsing fever are all prevalent, while typhoid fever, tuberculosis, cerebro-spinal meningitis, diphtheria, and influenza are also problems.

The chapter on staff and organization would have been more helpfully placed at the beginning than at the end of the report. The Sudan Medical Service combines medical and public health work and the administrative staff look after both aspects—a wise combination. The

staff of the Syrian medical officers are gradually being replaced by Sudanese medical officers trained in Khartoum. The subordinate Sudanese staff consists of dispensary hakims, sanitary hakims, and sanitary barbers, sheikhs' dressers and chiefs' dressers.

The following are some of the interesting points in the report. Great importance is attached to the preservation of health of the officials. The loss of work by sickness in 1932 is worked out at 5.9 officials compared with 16.0 in 1929.

Bilharziasis.—This is mildly endemic over a large area. The preventive work instituted consists of the establishment of bored-hole latrines close to the canals, and near villages, and the gradual installation of such latrines in individual huts in villages. The square deep pit latrine however seems to be giving more satisfactory results than the bored-hole latrine. The natural history and bionomics of the snail responsible for infection have been worked out and the knowledge obtained applied to their destruction.

Systematic treatment of infected persons is undertaken on a large scale.

Kala-azar is endemic in the Sudan along the Blue Nile as it emerges from Abyssinia into the Sudan. The incidence becomes smaller as the distance from the Abyssinian border increases.

A leprosy survey is being carried out and knowledge of the incidence of the disease is being acquired. Where the staple food is milk, the disease seems to be less prominent. Where cattle cannot survive in the 'fly country' the incidence of leprosy is very heavy indeed.

Malaria increases with the rise of the river Nile and decreases with its fall. Heavy rains in the autumn months produce epidemics.

Sleeping sickness.—New foci continue to appear. The flies lurk near springs, and visits to such springs lead to infection. Such springs are protected by thorn barriers to prevent access. There is danger that infection in the Sudan may spread by refugees coming from trans-border infected areas and stringent measures to prevent this have to be enforced. Several provinces, e.g., Mongalla, have been cleared and kept clear by such measures, despite the fact that they border on infected countries.

Yaws has been very successfully treated with novarsenobillon and the incidence greatly reduced.

Syphilis appears to be widespread however. It is curious that in Khartoum syphilis of the central nervous system is as common as it is in Europe, whereas in the provinces this is not so.

Tuberculosis is a very definite problem, especially in the Southern Sudan where large sections of the population have only recently been brought into contact with the outside world. The disease is the subject of increasing investigation and a large proportion of the population is being tested by the Mantoux test.

Ophthalmology.—A report is given of a rather mysterious outbreak of blindness in certain tribes. The condition is one of retino-choroiditis followed by optic atrophy. The cases appear not to be retinitis pigmentosa, although a familial history is given in some cases.

Medical work.—Mobile hospitals are urgently required, the policy at present pursued is the establishment of a network of dispensaries throughout the province, especially in sleeping-sickness areas. Excellent medical work is carried out by medical missions. Medical training is given at the Kitchener School of Medicine at Khartoum and about 10 new students are annually admitted. There are also a Midwifery Training School and a Nurses' Training School at Omdurman. Work in this province must be full of interest and the report testifies to the interest taken by the medical service in its many-sided work and to a large amount of excellent and conscientious work done both in administration and executive work.

Correspondence

INTRAVENOUS GLUCOSE IN PNEUMONIA AND OTHER TOXÆMIC CONDITIONS LIKE ECLAMPSIA AND SUTIKA

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR,—I recently treated two cases of pneumonia by intravenous injection of ten c.cm. of 12.5 per cent glucose solution and from the results I am led to believe that glucose given intravenously on the 4th or 5th day averts the crisis of pneumonia, probably by neutralizing the toxin liberated by the pneumococcus. In both the cases the fever came down by lysis and took about fourteen days to reach normal. In another case, treated at the same time, in which glucose was not given fever came down by crisis on the 7th day accompanied by profuse perspiration and purging.

I have also tried glucose by the intravenous route in *sutika* and I have had gratifying results in almost every case, and the same treatment has given good results in eclampsia in combination with morphine and atropine injections.

Sutika is a Bengali term used for the complicated puerperal complaint characterized by alternate constipation and diarrhoea, loss of appetite and loss of weight, occasionally accompanied by low fever. It appears to be purely a puerperal complaint due to some unknown toxin.

Yours, etc.,
CHINTA HARAN GHOSE,
L.M.P., L.T.M.

KASRA,
30th July, 1933.

PHYRYNODERMA: A CONDITION DUE TO VITAMIN DEFICIENCY

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR,—I have seen to-day a copy of the *Archives of Dermatology and Syphilology* of November 1933. On page 700 there is a paper by L. J. A. Loewenthal on 'A New Cutaneous Manifestation of Vitamin-A Deficiency'. The description suggests that he is probably referring to a condition the same as, or very similar to, that described by me in a paper that I forwarded to you on 16th September last. If you have not yet published this paper, I trust that you will give the date of receipt of my typescript. I proposed the name 'phrynoderma'; Dr. Loewenthal suggests no name for the manifestation he describes. Apparently, Dr. A. Pillai described a similar condition from China in 1929.

I am not particularly anxious over the question of priority, because obviously their papers appeared first, but I would like the date of the receipt of my paper to be mentioned, as it will show that I could not have been aware of this paper by Dr. Loewenthal when I wrote my paper.

Yours, etc.,
LUCIUS NICHOLLS.

BACTERIOLOGICAL INSTITUTE,
COLOMBO, CEYLON,
18th December, 1933.

[Note.—Dr. Nicholls' paper was received by us on 21st September, 1933, and was published in our December issue, page 681.—EDITOR, I. M. G.]

Service Notes

APPOINTMENTS

ON return from leave, Major-General Sir Robert McCarrison, Kt., C.I.E., K.H.P., an officer of the Medical Research Department, is placed on foreign service under

the Indian Research Fund Association, with effect from the 9th December, 1933, for appointment as Director, Nutritional Research.

Lieutenant-Colonel R. E. Wright, C.I.E., Professor of Ophthalmology, Medical College, Madras, and Medical Superintendent, Government Ophthalmic Hospital, Madras, is appointed to officiate as Surgeon-General with the Government of Madras, with effect from the afternoon of 11th October, 1933, until further orders.

On return from leave Lieutenant-Colonel G. Covell is placed on foreign service under the Indian Research Fund Association for appointment as Assistant Director, Malaria Survey of India, Kasauli, with effect from the 14th October, 1933.

Lieutenant-Colonel E. W. O'G. Kirwan, on return from leave ex-India, is re-appointed as Professor of Ophthalmic Surgery, Medical College, and Ophthalmic Surgeon, Medical College Hospitals, Calcutta.

Captain M. L. Aluja and Captain S. M. K. Mallick are appointed substantively to the Medical Research Department, with effect from the 7th March, 1933, and the 1st April, 1933, respectively.

Major W. J. Webster, M.C., Officiating First Assistant Director, King Institute, Guindy, Madras, is appointed as a Supernumerary Officer at that Institute until further orders, with effect from the date on which he is relieved of his present duties.

Captain J. C. Drummond, whose services have been re-placed temporarily at the disposal of the Government of Bengal, is re-appointed to do general duty at the Medical College Hospitals, Calcutta, with effect from the 26th September, 1933.

APPOINTMENTS AND TRANSFERS

The services of Brevet-Colonel J. McPherson, K.H.S., an Agency Surgeon, are re-placed at the disposal of His Excellency the Commander-in-Chief in India, with effect from the forenoon of the 16th October, 1933.

Lieutenant-Colonel J. B. Hance, O.B.E., an Agency Surgeon, on return from leave, is posted as Residency Surgeon in Mysore, with effect from the forenoon of the 16th October, 1933.

The unexpired portion of his leave is hereby cancelled.

Lieutenant-Colonel J. A. S. Phillips, Director of Public Health, Bihar and Orissa, is appointed to officiate as Inspector-General of Civil Hospitals, Bihar and Orissa, in addition to his own duties, with effect from the 24th October, 1933, until further orders.

The services of Major N. B. Mehta are placed temporarily at the disposal of the Government of Bengal, with effect from the 7th October, 1933, for employment in the Bengal Jail Department.

The services of Captain H. S. Waters are re-placed temporarily at the disposal of the Government of Bombay, with effect from the 10th October, 1933.

The services of Captain J. C. Drummond are re-placed temporarily at the disposal of the Government of Bengal, with effect from the date on which he resumed charge of his civil duties.

Lieutenant F. W. Whiteman, I.M.S., is restored to the establishment, 18th October, 1933.

LEAVE

Major-General J. D. Graham, C.B., C.I.E., K.H.S., Public Health Commissioner with the Government of India, is granted with effect from the 11th December, 1933, leave on average pay for 1 month and 22 days combined with leave on half average pay for 26 days preparatory to retirement.

PROMOTIONS

Lieutenant to be Captain

Jeremiah O'Neill. Dated 23rd October, 1933.

Lieutenant to be Captain (Provl.)

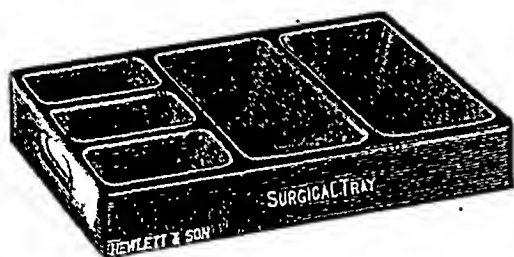
G. W. Miller. Dated 4th August, 1933.

The seniority of Lieutenant F. W. Whiteman is ante-dated to the 18th October, 1932.

Notes

A NEW SURGICAL INSTRUMENT TRAY

THE new instrument tray illustrated below possesses several advantages over the ordinary type. It is made of best white porcelain, size 16 ins. \times 12 ins. \times 2½ ins., with rounded corners and sloping sides, and is thus easily washed and sterilized. Moulded partitions divide the tray into five compartments, so that instruments may be kept separate, the smaller divisions being particularly useful for surgical needles. In the event of the disinfecting solution being cloudy, the instruments required can easily be found, as the sloping sides cause them to roll to the centre of the compartment, thus



obviating the necessity of groping all over the dish as would be the case with the ordinary type.

Further, the separate compartments enable the tray to be used for both wet and dry dressings.

It can be strongly recommended to the profession as an excellent small instrument and dressing tray for general clinical work. The sunk handles allow of easy and safe carrying.

The tray is manufactured by C. J. Hewlett and Son, Ltd., surgical instrument makers, 35-42, Charlotte Street, London, E.C. 2.

THEELIN AND THEELOL. PARKE, DAVIS AND CO.

THEELIN

THEELIN is the ovarian follicular hormone in pure crystalline form. The ovarian follicular hormone has been demonstrated in the follicular fluid of the ovaries, in the placenta, in the amniotic fluid, and in the blood and urine of pregnant animals and women. The isolation of crystalline Theelin is a most noteworthy step in the development of our knowledge of ovarian physiology and ovarian organotherapy. The credit for this achievement belongs to Dr. E. A. Doisy, Professor of Biochemistry at St. Louis University.

Theelin is manufactured and distributed solely by Parke, Davis and Co., under license from St. Louis University, and each lot of the product is tested and approved by the Biochemical Laboratory of St. Louis University before being released for sale. It is standardized according to the Doisy method (modification of Allen-Doisy procedure), its potency being expressed in terms of rat units. A rat unit is the amount of hormone necessary to induce estrus with cornification, as judged by vaginal smears, in an ovariectomized sexually-mature rat.

Therapeutic indications

Theelin has been subjected to clinical trial in a great variety of conditions characterized by disturbance of uterine or ovarian function, following the lines suggested by the fact that the ovarian follicular hormone is produced in great abundance during the early months of pregnancy and may therefore be regarded as supplying a much-needed stimulus to the reproductive system. As a result of this investigation it has been learned

that Theelin is of particular value in disorders due to the natural menopause-vasomotor disturbances evidenced by headache, hot flushes, insomnia, emotional instability, etc.

A related condition is functional amenorrhea, either primary or secondary. Theelin has proved very satisfactory in both types, but especially in the secondary type, some incidental derangement having interfered with the regularity of the periods. Other disturbances of the sexual cycle, such as oligomenorrhea, dysmenorrhea, and menorrhagia, are amenable in selected cases to the action of Theelin.

Theelin is administered by intramuscular injection, since it is only feebly active when given orally; it is supplied in boxes of six ampoules of 1 c.cm. each, and also in boxes of six vaginal suppositories.

THEELOL

Theelol is similar to Theelin in estrogenic activity, but is distinctive in that it is effective on oral administration. The practical importance of this new hormone, which offers a means of stimulating estrogenic activity and at the same time does not necessitate hypodermic injection, will at once be apparent to the clinician.

Theelol is available in only one form—Kapseals (sealed capsules) for oral administration, and is put up in bottles of 20 Kapseals, each containing 50 rat units.

Literature on the above products is available from Messrs. Parke, Davis and Co., P. O. Box No. 88, Bombay.

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SCIENTIFIC Articles and Notes of interest to the profession in India are solicited. Contributors of Original Articles are entitled to receive 25 reprints *gratis*; additional reprints can be obtained on payment. No reprints will be supplied unless contributors ask for them at the time of submitting their manuscripts.

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Original Articles

ABDOMINAL PREGNANCY SECONDARY TO TUBAL GESTATION AT TERM

By M. M. CRUICKSHANK, M.Sc., M.B., Ch.M.
MAJOR, I.M.S.

Superintendent, Government Hospital, Tanjore

and

S. T. ACHAR, M.B.B.S.

Honorary Lady Assistant Surgeon, Government Hospital, Tanjore

A HINDU woman, age 22 years, was admitted into the Government Headquarter Hospital, Tanjore, on the 11th May, 1933, with a history suggestive of malarial fever.

Condition on admission.—The patient was eight months pregnant (third pregnancy), anæmic, with some œdema of the legs, a slight degree of myocarditis, and a blood pressure of 120 mm. of Hg.; her urine was loaded with albumin; and there were scattered râles over both lungs posteriorly.

Height of uterus—thirty-four weeks. Condition of uterus—not acting. Position of fœtus—oblique, head in the right lumbar area. Fœtal heart—136. Vaginal examination not carried out.

After treatment with magnesium sulphate, diuretics and digitalis, the blood pressure fell to 106, and the œdema cleared up. The temperature remained normal during the patient's stay in hospital. An attempt at external version failed. The patient, having improved, left the hospital on the 30th May, against advice.

She was readmitted at 8 p.m. on the 16th June, giving a history of having had labour pains during the previous twenty-four hours and of continuous vomiting. Her urine contained a trace of albumin and there was some slight œdema of the ankles. Her blood pressure was 100, pulse 120, and temperature 101.2°F.

Abdominal palpation.—Fœtal limbs and head very readily felt beneath the abdominal wall, suggesting a ruptured uterus. Fœtal heart not audible.

Vaginal examination.—The cervix was soft; the os admitted one finger; pieces of fleshy tissue could be felt, suggestive of a decidua cast; and the examining finger was blood-stained. The uterus was the size of an eight-weeks' pregnancy.

A provisional diagnosis of secondary abdominal pregnancy was made and the patient prepared for immediate operation.

Operation.—Abdominal section was performed under chloroform anaesthesia. With the incision of the parietal peritoneum the gestation sac was opened and meconium-stained liquor amnii escaped. A living child was removed and the cord severed between a pair of Kocher's forceps. The child, a female, weighed five pounds and showed no signs of any abnormality.

The placenta, within a thin gestation sac, lay in the left lower abdominal quadrant. The sac was but lightly adherent to the large intestine and was readily removed. It is of importance to note here that the placenta was not adherent, in the ordinary sense of the word, to any structure, but was apparently contained in a sac, which was readily removed.

The sac which contained the placenta arose from the middle third of the right Fallopian tube as a thick rounded pedicle, which was clamped, transfixed, and ligated with silk. The fimbriated and uterine ends of the tube were distinctly made out. Later, a probe was passed along the tube from either end, and we consider that the tube had remained potentially patent, being occluded merely by the pressure of the amniotic sac.

The uterus, which was now seen to be the size of that of an eight weeks' pregnancy, was displaced to the left. Both broad ligaments were defined and their relations found unaltered. The left ovary and tube were healthy, the right ovary was not seen. The abdomen was closed with drainage and a pint of glucose saline left in the peritoneal cavity. Though the child did well, the mother gradually sank and was removed from hospital by her relations on the 10th June.

There are several interesting features in this case:—

(a) The youth of the patient.

(b) No prolonged period of sterility preceded the extra-uterine gestation.

(c) Delivery of a full term, living and normal child.

(d) The formation of a gestation sac.

The question which requires answering in these cases is 'what tissues actually form the gestation sac?'

In our opinion what has happened in this case is that the fertilized ovum has become embedded in the maternal tissues of the tube either between the mucosa and the muscular layers or between the muscular layers themselves. The ovum has then developed in the wall of the tube external to its lumen, the tissues of the tube proper forming the gestation sac.

In intra-uterine pregnancy the embedding of the ovum is not deep, penetration never extending beyond the mucous membrane into the muscle, indeed it does not reach very deeply into the mucosa (Eden and Lockyer). The more superficial than the embedding of the ovum in the tube, the greater the similarity to a uterine pregnancy. When the ovum is embedded in the mucosa of the tube a true decidua vera is not formed, the mucosa being deficient in stroma cells. On the other hand should the ovum become embedded between the muscle layers a more marked decidual reaction occurs with an attempt to form a decidua vera. In such a case, as in uterine pregnancy, with the expansion of the amniotic sac, the decidua capsularis and the decidua vera come into contact and these layers, as do also the villi of the corresponding layer of the chorion beneath the decidua capsularis, atrophy and the thinned-out chorion lœve remains.

It is stated that the ability of the Fallopian tube to continue to accommodate the growing embryo till full term is uncertain, but cases are on record where this has occurred.

In such cases, if the tube does not rupture, then the placental chorion escapes injury, and even should the tube rupture the placental chorion may escape injury, provided that the amnion and the chorion lœve have remained intact. If the tube ruptures into the peritoneal cavity, the amnion remaining intact so that the fœtus may continue to live, the placenta grows out through the rent and gains attachment to neighbouring organs and peritoneal surfaces; a layer of lymph forms on the exposed amnion,

forming a secondary gestation sac and a so-called tubo-ovarian pregnancy. Similarly, as in the case of the placenta, this secondary gestation sac becomes closely adherent to neighbouring structures. In this intraperitoneal variety the placenta is usually found lying below the foetus.

It is well known that in these cases removal of the placenta and sac may be attended with severe hæmorrhage and the method of dealing with these placenta constitutes one of the problems of surgery.

The case recorded was one of the intraperitoneal variety, but one in which we consider that there was no rupture of the tube, with therefore no consequent outgrowing of the placenta. This is evidenced by the fact that the sac, a primary gestation sac, and the placenta formed no adhesions to neighbouring organs or peritoneal surfaces, and were readily removed from the part of the large gut to which there was the semblance of an adhesion; this was due to the fact that non-inflamed peritoneal surfaces were in contact.

To prove that the Fallopian tube had not ruptured, a microscopic section of the gestation sac should show, from within outward, peritoneum, muscularis mucosæ of tube, perhaps some decidual cells with atrophic trophoblastic villi, atrophic chorion, the chorion lœve of the anatomists, and amnion. Pieces of the gestation sac in this case were sent to the pathologist, Madras Medical College, who very kindly made sections and sent us the following report:

'Section shows the fibrous wall of a cyst, which is lined internally by a bluish-staining granular material in which nuclei are not seen'. The microscope, then, does not help us to prove that the Fallopian tube remained intact in this case.

In studying these cases it is very necessary to have in one's mind a classification of the primary and secondary terminations of ectopic pregnancy. Schumann's classification seems the most comprehensive and useful (*Gynecological and Obstetrical Monographs*, Vol. VII, 1931).

(1) Primary terminations

1. Resorption of the ovum.
2. Death of the embryo with the formation of a tubal mole.
3. Tubal abortion.
4. Rupture of the pregnant tube into (a) the peritoneal cavity, or (b) the broad ligament.
5. Growth and development of the foetus to full term while still confined within the tube.
6. Interstitial pregnancy, which may terminate by the growth of the foetus into the uterine cavity, the placenta remaining attached to the original site.

(2) Secondary terminations

Tubal rupture, or less commonly tubal abortion, may be succeeded by one of the following:

1. Tubo-abdominal pregnancy, the placenta remaining attached to the tube, the foetus being free in the abdomen—a rare condition.
2. Secondary abdominal pregnancy, the entire ovum being expelled into the abdominal cavity.
3. Tubo-ovarian pregnancy.
4. Intra-ligamentary pregnancy.
5. Ovario-abdominal pregnancy.
6. Abdominal pregnancy secondary to ovarian pregnancy; theoretically possible just as an abdominal pregnancy may be secondary to a tubal rupture.

Werth has demonstrated that cases reported as primary abdominal pregnancies, where the ovum has been fecundated while free in the abdominal cavity and become implanted on any tissue with which it has come in contact—a theoretical possibility, are in reality of tubal origin.

Litzenberg (*American Journ. Obst. and Gynec.*, 1920, I, 223) states that it is impossible for an ovum to implant itself primarily upon the peritoneum. The case described then may be considered as one of primary extra-uterine pregnancy, nidation proceeding at the point of first arrest, its termination being primary and falling under group 5.

As already stated, the question at issue is, 'Is it possible for a tubal pregnancy to go to full term and remain in the tube without rupturing any one of the layers forming the tube?' Opinions as to this point are very vague as a reference to one or two cases in the literature will show.

Conaway (*Trans. Philadelphia Obst. Soc.*, 1911-13) reports a case, where the ovisac, which consisted of the right tube, bore the same relations to uterus and ovary and broad ligament, as a hydrosalpinx. The tube contained a perfectly formed, dead foetus, weight four pounds, and two quarts of slightly greenish fluid. The placenta was attached to the posterior surface of the sac and lay between the layers of the broad ligament. The placental vessels were thrombosed; the ovisac was thin and was ruptured while freeing it from the parietal peritoneum. Schumann places this case in group (1) 5.

Horsley (*Surg. Gynec. Obst.*, 1913-17, 58) describes a case where the child was found lying in the left side of the abdomen among the intestines, covered only by a thin membrane, which also surrounded the placenta. The placenta and sac had a distinct pedicle, which arose from the left broad ligament. A few adhesions of the sac to the intestines and the omentum were readily separated. Considering that the placenta was surrounded by the thin membrane, which formed the sac, and was but

lightly adherent to gut and omentum, this case might be grouped under (1) 5.

Summerville and Thomas (*Internat. Journ. Med. and Surg.*, 1932, XLV, 550), describing a case of eleven-months' abdominal pregnancy, state that, though every physiologic process occurring in normal uterine pregnancy is repeated, every element is pathologic, as the ovum is embedded in tissue anatomically unfit for its implantation and development. Because of its greater thickness, the uterine stroma and mucosa are able to form a decidua that can harbour the ovum and simultaneously protect the uterine musculature from the corrosive action of the trophoblast. In the tube the stroma is scanty and, although scattered groups of decidual cells may be found, there is no true decidua. Attempts are made by the tube to form a decidua capsularis and basalis, but the tissue formed is weak and easily ruptured by the invasion of the trophoblastic villi. The ovum is then set free in the lumen of the tube with hæmorrhage consequent to the rupture of the internal ovum capsule. Here the ovum may cease to live, or it may retain its placental attachment and continue to develop. If it is expelled from the tube into the abdominal cavity and continues to develop it becomes a secondary abdominal pregnancy, with a spread of the placental area over contiguous surfaces of broad ligament or adjacent pelvic organs.

Commenting on their case, in which the child, amniotic sac and placenta were apparently normal, Summerville and Thomas are of the opinion that what happened was probably a slow erosion and gradual rupture of the tubal wall without excessive hæmorrhage, which if severe would have produced fulminating symptoms, the placenta retaining its original implantation with a spread to adjacent structures thus permitting gestation to proceed within the abdominal cavity.

Hellier (*Journ. Obst. and Gynec. Brit. Emp.*, 1924, XXXI, 66-67) describes a case of secondary abdominal pregnancy, but his only comment is that the pregnancy took place in the left tube, which partially ruptured, but as the amniotic sac remained intact the fœtus was able to develop for four months.

Kynoch (*Trans. Edinburgh Obst. Soc.*, 1925, XLV, 159) describes a case of abdominal pregnancy secondary to tubal gestation at term. He states, 'it may I think be assumed that the primary implantation of the ovum was in the right Fallopian tube and by gradual erosion or giving way of the upper wall had passed with unruptured membranes into the abdominal cavity'. Curiously enough in Kynoch's case the placenta was peeled off with but little hæmorrhage while the sac was so firmly adherent to peritoneum that it was plugged with a Mickulicz tampon and its edge sutured to that of the abdominal wound. Kynoch quotes Werth of Kiel and Taylor of Birmingham, as stating

that such cases might follow erosion or gradual stretching of the upper wall of the tube with the escape of the fœtus into the abdominal cavity surrounded by intact amnion.

The question of course which remains to be settled is whether it is (a) an erosion with the escape of the fœtus out of the tube, (b) a gradual stretching of the tube, the fœtus being retained within the stretched wall of the tube, or (c) an erosion of the inner wall of the tube the fœtus escaping into the lumen of the tube, which otherwise remains intact, simply stretching to accommodate the growing fœtus. Schumann's remarks on placentation are of interest as bearing on the case described by us. According to him tubal and uterine placenta are identical in formation, with this difference, that as development proceeds the thin tube wall, lacking a true decidua serotina, is easily invaded by the trophoblast and syncytial cells, since no active connective tissue reaction is set up in the tube by the presence of foetal cells. The villi rapidly penetrate the tubal wall and are soon found beneath the serous coat, which is invaded and hence ruptures. The tubal placenta also lacks nutrition, the false sinuses not being comparable to the rich blood supply of the uterine wall, a probable explanation of the great number of pathological embryos found in extra-uterine gestations.

Why most rupture and a few go on to term is explained by Schumann as due to an inherent phylogenetic action in certain tubes enabling them to resist the erosive action of the villi and to accommodate themselves to the immense distension of the growing fœtus, or perhaps to some primitive reversion of the tube to its uterine origin permitting it to take on, to some extent, the morphology of the uterine cornu of the lower animals.

In advanced cases the structure of the foetal sac is comparable to that of an intra-uterine pregnancy. It is greatly thinned out, the muscular fibres rapidly undergo a metaplasia into connective tissue, though they may always be found unchanged in greater or lesser number. In some cases muscular elements may be very pronounced and so dense that contractions are so marked as to suggest a uterine body.

Spackman (*Indian Med. Gaz.*, LXVIII, 511) describes a case of full-term gestation, where the ampullary portion of the right tube was dilated to form a gestation sac from which the child was delivered. The placenta was widely adherent to the under surface of the sigmoid flexure and to the back of the uterus and peritoneum of the lower abdomen, and could not be entirely removed on account of the danger of interfering with the blood supply to the sigmoid colon. Here is a case where the amnion has remained intact, allowing the fœtus to develop to full term, but the tube has ruptured,

and the placenta, growing through the rent, has made attachments to surrounding structures.

In the case recorded, it is our opinion that the Fallopian tube remained intact, and this opinion we base on the fact that neither amniotic sac nor placenta were adherent to any surrounding structure, but were contained in a primary gestation sac, covered by tubal peritoneum, which could not normally, and did not, form any adhesions to surrounding structures.

A NEW OPERATION FOR THE CURE OF ASCITES

By F. C. FRASER

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THIS operation rests on the evidence of but a single case, but so many cases of ascites are intractable to all known methods of treatment, both medical and surgical, that it seems worth while drawing attention to this new operation. Moreover, it was performed in a most intractable case, in which all other treatments had failed, and it was attended with such instantaneous relief that further proofs of its efficacy need not be awaited.

The patient, aged 3½ years, was admitted to the Headquarter Hospital, Coimbatore, on 13th March, with a history of ascites which had developed after an attack of jaundice four months before. The ascites was of a very high degree, the patient resembling an enormous barrel from which the puny limbs projected like sticks. He was quite unable to walk or even stand. Portal cirrhosis was diagnosed and the usual medical treatment, as well as paracentesis abdominis, adopted. As he failed to improve under treatment, the parents took the child away to Madras on the 24th March and he was admitted to the General Hospital where he remained for some three months, paracentesis being performed no less than seventeen times. As he was steadily declining and the ascites was not bettered, the parents returned to Coimbatore and had the child readmitted to the hospital here on the 3rd July. His condition then was decidedly worse, the ascites more accentuated and the epigastric angle completely obliterated by the distension of the abdomen.

First operation.—At the request of the parents I performed abdominal section on the 11th July. The omentum was split into two halves from its free border to its root, and each half was carried between the muscles of the anterior abdominal wall and anchored there by sutures.

The wound healed by first intention, but paracentesis had to be performed again as early as the 22nd July to save the young scar from bursting open from distension. This first operation was thus a complete failure as so often happens. Throughout August paracentesis had to be performed repeatedly.

Thinking over this case one morning, I wondered if the procedure adopted in the radical cure for hydrocele would have the same beneficial results in a case of ascites. True, it would

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INFANTILISM AND CIRRHOSIS OF THE LIVER

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GROWTH may be delayed or arrested in several conditions. Though the endocrine glands are mainly concerned in regulating growth, other tissues in the body are also responsible to some extent. Generally speaking, delay or arrest of growth can be classified under two headings,

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not be possible to turn the peritoneal sac inside out, but one could cut away as much of the parietal peritoneum as possible, which would amount to the same thing. With the consent of the parents, this was done on the 1st September.

Second operation.—An incision running from just above the pubes to well above the umbilicus was made and the peritoneum on each side of the wound stripped up by gauze dissection nearly to its reflection on to the ascending and descending colons, the general oozing of blood being easily arrested by hot saline gauze swabs. The abdomen was then closed with a continuous silk suture, no drain being put in. A small dose of morphia was given prior to the operation to abolish any chance of shock.

The wound healed by first intention, the stitches being removed on the eighth day, by which time but very slight refilling was going on. The size of the abdomen became static on the 12th day after the operation, and from then onwards began rapidly to decrease in size. Simultaneously, a very striking network of veins sprang into appearance on the thorax, some of the veins being quite varicose and extending to above the clavicles. Improvement was steady from then onwards until the 20th September on which date the child was discharged cured. I last saw him on the 21st October, when he had assumed the normal size of a child and was running about happily.

The features of this case were the intractable nature of the disease, the child having been tapped no less than twenty-five times, the failure of all other methods followed by instantaneous relief after the above operation, and, lastly, the dramatic appearance of the portal-systemic anastomosis so shortly after the operation.

It will be argued against the operation that the danger of intestinal obstruction from adhesions is too great a risk; I am prepared to admit that there is such a risk, but frequently in these cases of tuberculous peritonitis where the gut is hopelessly matted together and to the abdominal wall the patients exist comfortably for many years. The outlook in intractable ascites is so hopeless that almost any risk is justifiable.

dwarfism and infantilism. 'In dwarfism, growth alone is affected, whereas infantilism consists in an arrest or retardation, not of growth only, but of the whole development including the secondary sex characters' (Hutchison, 1931).

Infantilism associated with congenital syphilis and cirrhosis of the liver has been described by Hutchison (1931) and Gilford (French, 1928). Fittipaldi (1931) described cases of infantilism associated with disorders of the hepato-splenic apparatus and concluded that both infantilism and the hepato-splenic lesions were expressions of an abnormal constitution.

Cases of familial hepatic infantilism were reported by Exchaquet (1931). He showed that retardation of development in these cases was undoubtedly due to the condition of the liver. He considered that the infantilism was due to lack of carbohydrates, as he found hypoglycæmia in these patients. Poynton and Wyllie (1926) pointed out that familial tendency and infantilism are the special features of cirrhosis of the liver in children.

The following case is an example of infantilism associated with syphilitic cirrhosis of the liver.

Case notes. History.—T. N., a Hindu male, about 15 years of age, was admitted into the medical wards of the King George Hospital, Vizagapatam, on 6th November, 1931, for swelling of the abdomen of four months' duration. About one year prior to admission into hospital, he was examined in his school by a medical inspector, who reported to the parents that the boy had an enlarged liver. He was under allopathic treatment from that time. The liver, though diminished in size, became hard and the abdomen gradually began to distend with fluid.

The patient was the sixth surviving child in the family. Two children died at about the ages of two years and eight months, respectively. There was no history of similar trouble in any of the other members of the family.

The patient was not addicted to either alcohol, in any form, or tobacco. There was no history of malaria nor other fever, nor of dysentery. The main articles of the diet were rice and *cholan*; *dhal*, condiments, milk and milk products were used only occasionally, but chillies were taken daily in excess; meat and fish were taken about once a fortnight.

Physical examination.—The patient was extremely emaciated, with practically no subcutaneous fat and all the bony points were very prominent (see figure 1). He was slightly anæmic with a sub-icteric tint of the conjunctivæ. There was slight bossing of the parietal eminences. The lymphatic glands in both the posterior triangles of the neck were enlarged, palpable and shotty. The bridge of the nose was slightly depressed. There was no scarring around the mouth, and no signs of interstitial keratitis were seen. All the teeth were well erupted, with the exception of the last molars (which were absent) in the upper jaw and on the left side of the lower jaw. The patient's height was 45.5 inches, and weight 38 lbs. The maximum diameter of the head was 19.5 inches. The temperature, and the pulse and respiration rates were normal.

The muscles of the chest were markedly wasted. Both the lungs showed diminished resonance over the bases, with numerous coarse râles. The heart was normal. The pulse was regular but of poor volume and tension. The maximum circumference of the chest was 23.0 inches.

The abdomen was markedly distended with free fluid and the flanks were bulging. The skin of the abdominal wall was tightly stretched and shiny. The superficial veins of the abdominal wall were much distended and the flow of blood in them was from below upwards. There was a hernial protrusion of the right inguinal sac, the contents of which could be reduced into the abdominal cavity. The left lobe of the liver, which could be felt 1½ inches below the xiphisternum, was hard, with a finely granular surface and a sharp edge. The maximum circumference of the abdomen was 28.0 inches.

The extremities were very thin and the skin over them was dry and inelastic. There was no œdema of any part of the body. No enlargement of the epiphyseal ends was noticed. The epitrochlear glands were definitely palpable and shotty. The knee jerk was not elicited on either side.

The general development of the patient was very poor and the secondary sexual characters were entirely absent. The head was proportional to the rest of the body. The patient appeared like a boy of nine years.

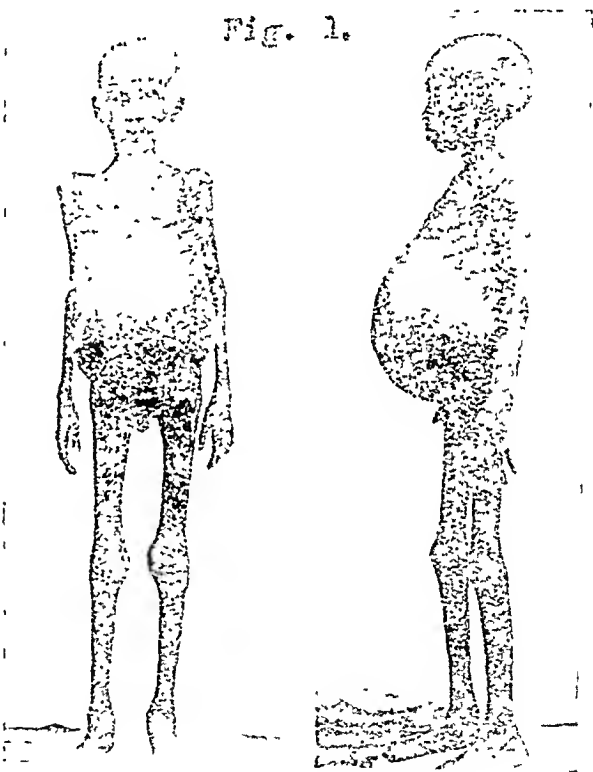


Fig. 1.

The axillary and pubic hairs were absent and the genitals were infantile.

Laboratory findings: (a) Blood.—

Hæmoglobin	..	80 per cent.
Red cells	..	5.25 millions per c.mm.
White cells	..	13,125 per c.mm.

Differential count.

Polymorphonuclear neutrophils	77 per cent.
Lymphocytes	.. 17 " "
Eosinophils	.. 3 " "
Monocytes	.. 2 " "
Mast cells	.. 1 " "

The blood smear showed marked anisocytosis and slight poikilocytosis of the red cells; no nucleated red blood cells or pigmented mononuclears were seen. The

coagulation time was 4 minutes and 33 seconds. Haemolysis of the red cells (fragility) began in 0.4 per cent saline and was complete in 0.25 per cent saline. The van den Bergh's reaction was—direct, delayed (faintly positive). Halometer reading of the blood film was 4.7 ($= 7.32 \mu$, i.e., normal).

The agglutination test with dysentery organisms was negative. The Wassermann reaction was strongly positive; the test was repeated with the same result.

(b) *Urine*.—This was dirty yellow in colour, slightly turbid and acid in reaction. Sugar, albumin, acetone, bile salts and bile pigments were absent. Phosphates, urates, indican, urobilinogen and urobilin were present. Microscopically, numerous triple-phosphate crystals and urates were found; no cells or casts were seen. The urica-concentration test showed that the kidney function was good.

(c) *Faeces*.—The motions were solid and brownish-yellow in colour; and many whip-worm and round-worm ova were present.

(d) *Ascitic fluid*.—This was bile-stained, clear, faintly alkaline in reaction, with a specific gravity of 1.007. The protein content of the fluid was 0.75 grammes per

cent. The cells were mostly lymphocytes, and the cell count was 40 per cubic millimetre.

The Wassermann reaction of the ascitic fluid was strongly positive. The agglutination test was positive for *B. dysenteriae* (Flexner) in dilutions up to 1 in 32. The fluid was sterile on culture.

(e) *Von Pirquet's test*.—Negative.

(f) *Röntgenograms*.—X-ray examination of the wrists showed that the ossific centres of the pisiform bones have appeared.

Progress and treatment.—The patient was afebrile during his stay in the hospital. He was given a course of sulpho-stab (14 injections) beginning with 0.3 gramme and gradually increasing to 0.45 gramme, together with injections of mercury. Iodides and mercury were administered orally. To improve the general condition iron and arsenic injections were given on alternate days and cod-liver oil was administered orally. Paracentesis of the abdomen was performed seven times while in the hospital, to relieve the pressure effects of the fluid. When the patient was discharged from the hospital on 23rd April, 1932 (after a stay of nearly 4½ months), his general condition was much improved and the fluid in the abdomen was not accumulating as rapidly as before. But the size of the liver and spleen did not show any diminution. The patient reported himself on 11th July, when he was readmitted into the hospital. Paracentesis of the abdomen was not done during this interval, as there was only a small quantity of fluid in the abdomen. His general condition showed marked improvement (figure 2).

Comment

The physical examination, the strongly positive Wassermann reactions of the blood and ascitic fluid, and the marked improvement of the patient after the administration of arsenic and mercury, clearly show that the case is one of syphilitic cirrhosis of the liver. The fact that the patient responded to treatment shows that the cirrhosis of the liver was not very advanced, although it had already manifested itself in portal obstruction.

As the ossific centres for the pisiform bones have appeared, it can be taken that this patient's age was above 12 years (Waddell, 1921). According to Powell (1902) the appearance of the 'wisdom' teeth varies from 14 to 27 years. As his right lower wisdom tooth has already appeared, the minimum age of the patient may be fixed at about 14 years.

French (1928) remarks that 'in determining whether development is implicated, stature, ossification, and sex development are of great but not decisive importance. Thus infantilism may coexist with gigantism; and the ossification in some patients with symptomatic infantilism is not only not delayed but is definitely premature'. In this case, though the ossification appears to be normal, the development is retarded. The sex development is very poor.

The absence of any endocrine disturbance, together with the improvement in the general condition of the patient after the treatment, point to the infantilism being probably due to the syphilitic cirrhosis of the liver. In this case, the degree of infantilism was not marked and the general condition bettered with improvement in the condition of the liver. As Hutchison (1931)



Fig. 2.

(Continued at foot of opposite page)

A NEW INTRAVENOUS ANÆSTHETIC: EVIPAN SODIUM

By G. H. FITZGERALD, M.R.C.S., L.R.C.P. (Lond.)
D.T.M. & H. (Lond.), D.P.M. (Cantab.)
MAJOR, I.M.S.

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THE general lack of gas-and-oxygen apparatus in this country renders the task of the surgeon not infrequently one of unnecessary difficulty, and there must be few who have not at some time or another wished for a means of inducing anæsthesia for short periods, rapidly and without risk or previous preparation.

Through the courtesy of the Indian representatives of the German firm of Bayer-Meister Lucius, I have recently been able to make a fairly extended trial of a new substance, evipan sodium, which is introduced intravenously, and which will produce anæsthesia lasting—according to the quantity administered—up to 45 minutes.

This drug, which is a derivative of barbituric acid of complex formula, is a white powder, readily soluble, and is put up for use in ampoules together with 10 c.cm. of distilled water, so that all that is required is to prepare a solution in a 10 c.cm. syringe.

The technique of injection is extremely simple, the requisite dose is injected into an arm vein, the first few cubic centimetres being injected *extremely slowly*. (I personally make a rule of two minutes for the first two cubic centimetres and thereafter two cubic centimetres per minute; this is perhaps erring on the side of

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remarks 'the degree of infantilism in this group (symptomatic infantilism due to severe constitutional disease) is usually but slight, and the clinical picture is dominated by the primary disease, on which also the prognosis depends'.

I wish to express my thanks to Dr. G. Dinker Rao, first physician, and to Dr. P. Kutumbaiah, second physician, King George Hospital, Vizagapatam, for permission to publish these case notes, and to Dr. P. Kesavaswamy, radiologist of the hospital, for the photographs.

REFERENCES

- Exchaquet, L. (1931). Familial Hepatic Infantilism. *Arch. Mcd. Enfants*, Vol. XXXIV, p. 656.
Fittipaldi, C. (1931). Infantilism and Hypo-Evolutionism in Disorders of Hepato-splenic Apparatus. *Clin. Med. Italiana*, Vol. LXII, p. 689.
French, H. (1928). *An Index of Differential Diagnosis of Main Symptoms*. John Wright and Sons, Ltd, Bristol.
Hutchison, R. (1931). *Lectures on Diseases of Children*. Edward Arnold and Co., London.
Powell, A. (1902). Medical Examination in Cases of Rape. *Indian Med. Gaz.*, Vol. XXXVII, p. 230.
Poynton, F. J., and Wyllie, W. G. (1926). Hepatic Cirrhosis in Children. *Arch. Dis. Childhood*, Vol. I, p. 1.
Waddell, L. A. (1921). 'Lyon's' *Medical Jurisprudence for India*. Thacker, Spink and Co. (1933), Ltd, Calcutta.

extreme caution.) Leakage into the tissues is harmless.

The amount to be given varies according to age, body-weight, length of anæsthesia required, and the general condition of the patient. The makers suggest, as a working rule, that if short anæsthesia is required, double the dose required to make the patient fall asleep (shown by his ceasing to count), and for a long anæsthesia, three times this amount; i.e., if the patient falls asleep after 3 c.cm. have been given, 6 c.cm. will suffice for such operations as opening an abscess or extracting a tooth, whilst for more prolonged work 9 c.cm. will be required. A safe maximum dose in a healthy adult is about 10 c.cm. and this amount I have never exceeded, nor should it ever be necessary to do so.

By the patient, all that is noted is an intense and uncontrollable drowsiness, and it is remarkable that even the most highly-strung subjects show no signs of excitement or apprehension as the drug is being given. Preliminary narcosis can thus be given whilst the patient is in bed, and the psychic trauma of removal to the theatre entirely obviated.

As sleep is induced, the respirations deepen, and there are often muscular spasms of the head, arms and legs. There is slight irritation of the bronchial mucosa, and patients with any tendency to cough, frequently do so for a time until narcosis has been fully established; indeed if a small dose only has been given the cough and muscular twitching may continue throughout. A full dose, however, abolishes this. In actual administration, relaxation of the jaw muscles is the sign to look for, the mouth falls open, the patient is now completely anæsthetized and the operation can be commenced, though as noted above, if longer anæsthesia will be needed, 50 per cent to 70 per cent more than this must be given.

I have now used it in a very large variety of surgical procedures, from opening abscesses and removing cysts to prolonged abdominal operations. In but one instance did any untoward result follow, namely in a debilitated man with a large abscess of the calf. Here 6 c.cm. only were given, but I abandoned my rule of two minutes for the first 2 c.cm., and gave them in one minute, the whole injection occupying about 2½ minutes. The patient became pulseless, respiration stopped, and nearly half an hour of the most vigorous restorative treatment were required before respiration was again established, though it is notable that on recovery the patient felt none the worse.

This was at the outset of my trial of the drug, and so impressed itself upon me that I insist on the injection being given as stated, though the makers claim that 4 c.cm. per minute may be given.

A trial was made of it in cataract extraction, but here it did not prove an unqualified success. As prolonged anæsthesia was not considered

necessary, 5 c.cm. only was given; at this stage there was much coughing, and the patients moved their heads from side to side; possibly a bigger dose would have been more successful, but it was feared that as consciousness returned there might be restlessness with interference to bandages. The pupil also became dilated and one missed the co-operation of the patient.

Apart from minor work, where it has proved invaluable, we have been employing it increasingly in operations where prolonged anaesthesia is required. Here the effect of the evipan is reinforced from the start by light chloroform anaesthesia. The patient, already deeply unconscious, is given a few whiffs of chloroform by a Junker's inhaler from time to time. There is no stage of excitement, and post-anaesthetic vomiting or toxæmia is unknown.

In two recent cases, one the removal of a massive renal tumour, and the other of a broad-ligament and ovarian tumour, both lasting over two and a half hours, six and seven draehms respectively of chloroform were used, and the patients at the end of the ordeal were in remarkably good condition, nor did they give any cause for anxiety whilst the operation was in progress. Relaxation is quite good, though of course not so perfect as under a spinal analgesic, but respirations are slow and regular, a great advantage in abdominal work. To those with experience of anaesthetics as generally administered in this country, these are points which need hardly be stressed!

In a series of blood pressure estimations made before and after operation under evipan, it was found that blood pressure fell between 10 to 15 mm. Hg.; this seems unimportant and may equally have been due to shock, though a similar fall was noted in experimental rabbits.

After-effects appear to be absent. The patients wake up as if after a natural sleep and there are no toxic symptoms.

To sum up, in evipan sodium we appear to have a most useful addition to the seemingly inexhaustible barbituric acid series, which can be used effectively as a substitute for gas and oxygen and as a 'chloroform sparer'. It can be given by the operator himself, if single-handed, and it requires nothing more than a Record syringe for its administration. With reasonable care it is perfectly safe and leaves no unpleasant after-effects.

MENTAL SUGGESTION IN EVERYDAY LIFE

By W. NUNAN, M.D.

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LET us take up the morning paper—irrespective of its political colour—and look at the advertisement columns. Here we have a testimonial by a well-known actress in which she

refers to the bloom of youth imparted to her skin by the use—morning and evening—of 'Dr. Cutiele's Skin Food'. Across the page a well-known African explorer and big-game hunter of international reputation spreads himself over a quarter column in large type in praise of a preparation presented for the relief of suffering humanity—at Rs. 2 per tin—by a philanthropic chemist, a preparation which the said explorer and big-game hunter guarantees to be an immediate cure for any human surgical ailment. Overleaf is a photograph of a famous cinema star, with shining regular teeth exposed to our admiring gaze in a broad expansive smile. Beneath this picture, the handsome hero of the 'movies' informs us that he uses Dento regularly—to which fact he ascribes the snowy whiteness of his dentures.

In the sporting section of the paper we read that, if we will only be careful to use none but Roeket's famous tennis balls, we shall be able to play tennis better than Suzanne Lenglen, or that if we wield only Wickets' unrivalled bat, we shall ensure our being selected to play for the Presidency against the M. C. C.

Now let us turn to a number of the *British Medical Journal*, or *Lancet*, just arrived by the English mail. On the very second page we read that the world-renowned chemists, Haggelheimer, whose immense laboratories are situated on the banks of the romantic, castellated Rhine, have recently isolated a new substance possessing a specific inhibitive effect upon the functions of the autonomic nervous system. It is said to have been proved clinically to be the *only* effective inhibitor of the vagus, and is indicated for the treatment of disturbance of intestinal motility, hyper-secretion, pyloro-spasm, spastic constipation, mucous colitis, biliary colic, bronchial asthma, or spasmodic neurosis.

On another page we read of a proprietary remedy which supplies the physiological stimulus to the endocrine glands, whose functional activity determines the normal catamenial flow. It is stated that when these internal secretions begin to fail at the period of the menopause, the preparation in question acts both by substitution and by homo-stimulation. Any female patient, then, who is approaching 'the change of life' in order to be rid of all the disturbances, physical and mental, peculiar to that critical period of her mundane existence, need only follow the simple directions on the bottle 'one or two tablets three times daily' while, as a sop to the anxious and potentially hostile practitioner, the subtle advice is added, 'as directed by the physician'. The advertisements in the medical press are as cleverly worded as any in the pages of a penny paper or monthly magazine of fiction.

Now let us turn from our papers and look out of the window to observe the passing show—across the street, below a mighty hoarding on which are displayed the advertisements of motor

cars, petrol, tyres (more mileage at less cost), baby foods, beer, whisky, Charlie Chaplin, watches, gramophones, radio-sets, pianos, cheap return tickets (1st, 2nd, and 3rd class) to Poona races (including admission to the course), binoculars (as example of association of ideas), vacuum-cleaners, safety-razors and prophylactic tooth-brushes surrounding a highly-coloured picture of an elderly well-groomed gentleman with eye-glass flying behind him, sliding down the banisters under the impulse of the 'Kruschen feeling'. One's attention is interrupted by a shout, a yell of pain, and the screaming child is caught up in the arms of a loving mother. Attention is drawn by the sobbing and indignant youngster to his bruised knees, and to his dust-smudged nose; whereupon the mother caresses the injured and painful areas, assuring him that the pain has gone. A moment afterwards the boy is once more careering on his scooter to the imminent peril of the innocent pedestrians. She leaves him only to rush to the perambulator in which the baby has started screaming. A soothing hand upon the restless little head, a monotonous, crooning lullaby, and master baby snuggles down to resume his disturbed slumbers.

In these poor pen-pictures of a few phases of the daily morning round, I have tried to put before you and to illustrate some examples of the mighty, surging, ever-present, ever-functioning power of suggestion.

There are good suggestions and bad suggestions. I know a man, perfectly healthy in all respects, who insists on his chest being carefully examined at frequent intervals and his weight noted for future reference and comparison, because some medical man a few years ago told him there was a suspicious patch in one of his lungs, with an x-ray photograph to confirm the diagnosis. I have a shrewd suspicion that he does not rely on my repeated assurances that he is as well as I am myself, but that he visits other practitioners for confirmation.

Luckily, he is rich enough to indulge in his hobby, and pays my fees regularly.

I know another man, intelligent, well educated, who for eight years worried—night and day—lest he should suddenly become totally blind, because of a careless word spoken by a London oculist, so much for malefic, or harmful, suggestions.

At home, in my native Limerick, I knew an old man, well over 80 years of age, strong, hale and hearty, who smokes tobacco strong enough to asphyxiate the average person with its fumes. During my leave in 1925, I visited him. In the course of conversation he gravely informed me that he had been suffering from an incurable disease for the last 45 years, and that none of the local medical men had succeeded in discovering either what it was or a remedy for it. If I had smiled I should have incurred his deadly enmity, so I gravely commiserated with

him on the shortcomings of modern medicine in diagnostic methods and therapeutics. This is a typical case of malefic self-suggestion, which, in this instance, fortunately, had not only not done the patient any harm, but had actually given him something of interest to talk about to any new-comer to the neighbourhood—a pastime which he thoroughly enjoyed. To cure him of this obsession would be to deprive him of a cheering pastime and sadden his declining years.

Desperate diseases or conditions sometimes call for desperate remedies, and I remember a very acute attack of diarrhea with violent pain, straining, blood and mucus—the classical dysenteric signs and symptoms—from which I suffered in 1916, when travelling in a horse waggon on the Bagdad Railway from Bagdad towards Samarra. The attack lasted for about 24 hours, and left me prostrate. On arrival at a halting place in the desert, I staggered across the sand into a medical officer's tent, and asked for something to eat, as by this time I was completely empty. All he had was a large lump of stale plum cake and a tin of sausages. I finished both with great gusto, and I never had another loose motion, or a pain or ache of any kind. The medical officer, aghast at my rashness, declared that my action was suicidal and predicted disaster, but his malefic suggestion was apparently rejected by my subconscious mind, for here I am—though I do not recommend the remedy.

This brings us to the word itself—suggestion. What do we mean when we speak of 'suggestion'? Many will answer—'hypnotism'. This reply entails another question—What is hypnotism? Let us analyse the word: *Hypnos*, as we all know, is a Greek word meaning sleep. Hypnotism then must mean a method of putting people to sleep, or at least must have something to do with sleep. Hypnotism is a word invented by an English physician, Braid. Later in life he regretted that he had invented the word, for in the great majority of cases it is a misnomer, since there is no sleep. Let us turn again to the answer, 'suggestion is hypnotism'. Well then, we must again ask, how is a state of hypnotism produced? The true answer is 'by suggestion'.

We must then arrive at the illogical conclusion that suggestion is caused by itself which is, as Euclid says, absurd. The truth probably is that all hypnotism is suggestion, but all suggestion is not hypnotism. The power of suggestion or rather of self-suggestion—and remember that all suggestion to be successful must intimately be transformed into self-suggestion—can be aptly illustrated by the simple experiments given by the late Monsieur Coué of Nancy—a name which will be remembered as that of one who showed the man in the street, after thousands of years, the mighty power of the human mind over the human body, for good or

for ill. 'Imagine', says Coué, 'that you are sucking a juicy very sour, lemon and your mouth will instantaneously and inevitably begin to water; you will, in technical language, salivate profusely. The very fact of imagining such a thing, of suggesting such a thing to yourself, has produced the reflex functioning of the salivary glands—just as if you had really sucked a sour juicy lemon. Again, you have only to imagine a slate pencil being scratched across a slate to produce grimaces, contortions, and bodily shiverings. Just as it is thus possible to produce disagreeable sensations by merely thinking of, or suggesting to ourselves, unpleasant things, it is also possible to produce agreeable sensations by thinking of pleasant things.

Our subconscious minds record all ideas which are presented to them, and it is for us to see that the ideas recorded are those of health and happiness, rather than of disease and misery, seeing that the subconscious mind, sooner or later, transforms into facts and verities the ideas which it records, when the ideas are not opposed to strong moral conviction and are not inimical to our interests. Between ourselves and our subconscious minds, however, or between the operator and the subconscious mind of his patient, there is a powerful barrier—the barrier of the conscious mind.

Let us take a concrete example—a man comes to a doctor's office and says 'Doctor, I have had terrible neuralgic headaches over the left side of my forehead for some months past—I have tried all sorts of remedies, but the headache recurs at regular intervals—usually about 5 p.m.'

The doctor pricks up his ears on hearing the last few words—for here we have the factor of expectation showing its ugly head.

As the hands of the office clock crawl slowly round towards 5 p.m.—whether standard or Bombay time—the tortured nerves begin to vibrate and across the supra-orbital area is felt a blinding sickening hopeless agony. The doctor makes as thorough an examination as possible of the physical condition, after going into the recent and remote medical history, diet, habits, mode of life, etc., in accordance with the exhaustive methods he has learnt so laboriously during his medical course, and satisfied that the patient is otherwise well in body and in mind, except for the natural depression of spirits due to his recurring pain, the doctor proceeds to put into practice the theories of suggestive therapeutics.

If he tells such a man 'you have no pain, because there is no physical basis for it nor organic disease to give rise to it. The pain is imaginary. You must not think about it', the reply will probably be unrepeatable and unprintable. At any rate the patient will seize

his hat and rush out of the office to visit a real doctor or a doctor who is not suffering from temporary insanity. Why? Because he *knows* he has a pain, his conscious mind informs him of the fact, and keeps drilling that suggestion of pain—recurring pain—into his subconscious mind, which accepts the suggestion without argument, analysis or criticism, and proceeds daily to transform the suggestions into verities and facts. As a matter of fact, his visit to the doctor will have increased the pain and implanted the idea of pain more fixedly in his mind. A suggestion is the implantation or the development of an idea, or ideas, in the mind of the patient. The idea may be implanted by the subject himself, self-suggestion (or as it is called sometimes auto-suggestion), or by the operator (hetero-suggestion or simply, suggestion). In order that suggestions may be accepted, a patient, ordinarily, must be rendered more suggestible.

It is the greatest mistake in the world to think that the highly-strung, self-centred, neurotic person is very suggestible. On the contrary, such a patient is likely not to respond to suggestion-therapy.

Sidi thus enumerates the conditions which tend to induce susceptibility to suggestion:

- (1) Fixation of attention.
- (2) Monotony.
- (3) Limitation of muscular movements.
- (4) Limitation of consciousness.
- (5) Inhibition, or the prevention of the intrusion of foreign ideas.

These conditions are all very well, and no one denies the necessity for their fulfilment before suggestion can succeed in a particular case. But how many of us here present can fix our attention? I know two medical students in Dublin who for two solid years played cards during lectures. How many of us can limit our consciousness, though we may apparently be able to limit our muscular movements? I say apparently because it is very rarely that the average modern man—and even more rarely that the average modern woman, who is, as we are all aware, getting more and more restless—can relax.

How many of us can relax our muscles? Let me make a simple test. Raise your arm until it is at right angles to your body and rest the hand upon mine. Do not press up and do not press down. Relax the muscles of the shoulder, upper arm, forearm and hand and let the weight of the whole arm rest upon my hand as if it were the arm of a corpse in which rigor mortis had not developed or had passed off. I now suddenly withdraw my supporting hand. What happens? Nine times out of ten, the arm either remains horizontal in the air, or drops a little way and then remains fixed for a moment, to drop again when the subject

remembers to let it fall. The muscles have not relaxed. Relaxation then is not so easy as it sounds.

Again, raise both arms above your head, and let them drop simply forward. If you have relaxed the muscles, each arm should drop by its own weight and swing like a pendulum beside the body. I have perhaps gone far enough to show you that the advice to relax is easily given but not so easily carried out.

Which of us again can produce in ourselves limitation of consciousness? A man, who for one reason or another suffers from insomnia, goes to bed determined to sleep. The very determination defeats its object, sets in action what has been well called 'the law of reversed effort', and he tosses about restlessly and sleeplessly throughout the night. When this has gone on for some successive nights, he goes to bed with the expectation of not sleeping, and his expectation is realized. He does not sleep—and so a vicious circle is set up. His sleeplessness in the first instance may have been due to financial or other troubles. Through the weary night he worries over them, and in the morning, weary and depressed, he finds himself less able to face his work and troubles, which therefore loom ever larger and more insurmountable, the whole sequence of events leading to a state of hopelessness, depression and despair. This is not a rare or fanciful picture. The medical man in general practice meets such cases daily. Woe betide the unfortunate who resorts to drugs—no matter what their nature—with or without 'the directions of the physician', and here let me for a moment ride a hobby of mine—at any rate it is a firm conviction—regarding the abuse of bromides. *Bromism*—the foul tongue—the stinking breath—the acne—pustular—red—disgusting—the moroseness—the dull-wittedness—the depression—the progressive cerebral degeneration—how many mental cases do we see go steadily down hill to hopeless and complete dementia, because, forsooth, 'bromides keep the patient quiet'.

The mental hospital of the future will, in my humble opinion, have two sections. In the first will be placed the incipient cases of mental derangement, which will be treated by psychotherapy by physicians who have specialized in the subject; many of these patients will never find their way into the second section, where will be accommodated only those unfortunates who, on account of serious organic central nervous deterioration or destruction, must be pronounced incurable. My time draws to a close, and I will ask you to have patience while I give you a résumé of three or four out of many typical cases that I treated by suggestion with satisfactory results:

(1) Male, aged 45, a case of depression and insomnia which had lasted several months following the death of a son.

Result.—Patient slept 6 hours after the first treatment, 7 hours after the second and 8 hours after the third and was, in his own words, 'a different man'.

(2) Female, aged 22, a case of pseudo-paralysis which had lasted 2½ years, contracted flexors of upper and lower extremities resulting in almost complete crippling—not only unrelieved but aggravated by tonics, massage, high-frequency currents, injections, etc., or rather, aggravated by the successive failures of these procedures to ameliorate the distressing condition.

Result.—Patient moved right wrist at second sitting, moved both wrists—full extension and flexion 20 times—at the third sitting, and now uses wrists and ankles freely.

(3) Male, aged 32, a case of obsession (*psychasthenia*); the patient was worried by imaginary armed Pathans; he had applied to the police for protection and ultimately refused to leave his house, lest he should be assaulted on his way to office. He had written his resignation to his employer and was in great mental distress.

Result.—At the second treatment, the patient tore up his resignation and within a week had resumed complete charge of his department.

(4) Male, aged 38, adipose, suffering from cardialgia, pain in heart had lasted about two years—no organic disease. Pain removed at first treatment; further treatment refused as being unnecessary—pain being absent. After some days, patient returned terrified. He had mounted his motor-cycle, when pain returned, more severe than ever.

Further treatment advised; these treatments given.

Result.—The patient confident that pain will not return. Twelve months have elapsed—I saw the patient a few days ago in the High Court, well, happy and entirely free from pain.

Conclusion

Now it only remains for me to quote to you the words of Bacon in his *Essay on Studies*:—

'Read not to contradict, nor to believe; but to weigh and consider'.

I will be asked 'Is suggestion then a cure-all—a panacea?' By no means—suggestion will often fail where medicines will succeed, just as it will often succeed where ordinary therapy has failed. I claim merely that suggestion is a powerful additional remedy, hitherto neglected. Suggestion will always fail where patients are hostile or non-receptive.

In conclusion, it is my belief—founded upon my own personal experience in active practice—that in most cases in which we can rely upon the intelligent co-operation of the patient—on essential consideration—we can nowadays, remembering that every physical ailment has a mental coefficient, give a hopeful and re-assuring answer to such a terribly piteous appeal as that of Macbeth to the doctor in the last act of Shakespeare's great tragedy:—

Can'st thou not minister to a mind diseased,
Pluck from the memory a rooted sorrow,
Raze out the written troubles of the brain,
And with some sweet oblivious antidote
Cleanse the stuff't bosom of that perilous stuff
Which weighs upon the heart?

NOTES ON THE TREATMENT OF ORIENTAL SORE WITH BERBERINE ACID SULPHATE*

By RABINDRANATH CHATTERJEE, M.B.
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ALTHOUGH this particular disease is rare in Calcutta, and only occurs amongst visitors from other provinces, we have had occasion to treat as many as two dozen cases at the Marwari Hospital during the course of the last two years and a half; it is needless to say here that all our patients were Marwaris, residents of Central India.

The only treatment that our patients received was a local infiltration of the sores with a 2 per cent solution of berberine acid sulphate, the brand we used being May & Baker's 'Orisol'.

Our procedure in treating these cases was as follows:—In cases in which there were more than two sores, at each sitting we infiltrated two only, each sore receiving not more than two punctures. One pair of sores was treated every second day. When each pair had received their initial infiltration, we again started with the first pair. The total maximum dose used at every sitting was 2 c.cm. of 2 per cent berberine acid sulphate. Not a single patient in our series ever showed any sign of local reaction or any toxic symptoms. From our series we have observed that to cure a patient, say with two sores, he will have to undergo in all 12 infiltration sittings with a total of 48 punctures, that is 24 punctures for each sore, and a total dose of 24 c.cm. of 2 per cent Orisol, during a total period of 24 days.

Pain.—It will be admitted that any injection will cause some degree of pain; in these infiltrations we have observed nothing more than the amount of pain that would normally be expected following an injection of this amount of fluid. Another question that has been raised previously is the possibility of the prior application of one of the new anaesthetics, e.g., percain, to the ulcer for a few minutes before infiltrations. We have never used any of these anaesthetics and have never met with any instance on which we considered that they were necessary.

For the performance of infiltration, all that is required is an air-tight glass syringe with a fine sharp needle.

In conjunction with the infiltration method, we have used of late a dressing of 2 per cent berberine acid sulphate ointment; these dressings have been found to keep the sores in a very clean and healthy state. Whether this ointment will lessen the number of infiltrations required we have not yet determined.

Conclusion.—Orisol, as used by us, has given entire satisfaction, without a single failure and

(Continued at foot of next column)

AN UNUSUAL FORM OF TUBERCULOSIS (REPORT OF A CASE)

By A. N. GOYLE, M.B., B.S., Ph.D. (Lond.)

A. VASUDEVAN, M.B., B.S.

and

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LARGE tumour-like conglomerate tubercles of the liver are so rare that no apology is needed for the publication of a detailed report of the following case:

History and course of illness.—Venkanna, a Hindu male, aged 36 years, was admitted to the Government Mental Hospital, Madras, on 5th July, 1929, with mental symptoms. In June 1931 he had pain in the joints more marked in the right knee, which disappeared under treatment. From February 1932 he had dysenteric attacks which were relieved by emetine, but he continued until his death in September to have an irregular rise of temperature ranging from 99° to 102°F.

Physical examination showed an ill-nourished man with a barrel-shaped chest. Over the left base, the percussion note was hyper-resonant with diminished resistance. Breath sounds were audible without adventitious sounds. Expectoration was moderate in amount and mucoid in character. The spleen was slightly enlarged. Blood culture gave a negative result. The Wassermann reaction of his blood was negative. Leucocytes numbered 8,000 with a relative increase of polymorphonuclears.

The stools did not contain *Entamoeba histolytica* at any time during his stay in the hospital.

Röntgen examination of the chest was interpreted as showing 'hilar tuberculosis and nothing abnormal elsewhere'.

A tuberculosis specialist examined him in August 1932, and remarked: 'No active signs of tuberculosis'.

Post-mortem examination.—This was done at the Mental Hospital, and the following report sent to us:

'A big hard mass of glands at the root of the lungs. The liver is studded with nodules of various sizes which offer some resistance to the cutting knife. The spleen shows similar nodules. There is also a small mass of glands in the left iliac region showing similar changes. The brain and other organs are normal'.

No diagnosis was made. The left lung, the kidneys, the liver, the spleen, and the glands were sent to us for examination and report. Looking at the organs, we thought the nodules represented secondary cancerous deposits.

The liver weighed 1,292 grammes. It was slightly smaller than normal. The capsule was slightly thickened. The organs did not show any marked distortion though the surface was finely granular. The surface showed numerous round nodules of varying size (plate I, fig. 1).

(Continued from previous column)

we see no reason why the drug should not be considered a specific for oriental sore?

My best thanks are due to our Superintendent, Rai Bahadur Dr. S. C. De, M.A., M.B., for his kind permission to publish this note.

PLATE I.



Fig. 1.
The outer surface of the liver showing
tuberculous nodules of varying size.



Fig. 2.
The cut surface of the liver. Note the nodules of
varying size in the substance of the organ.



Fig. 3.



Fig. 4.

There were numerous fissures on the surface of the largest nodule but no definite umbilication, as seen in secondary cancerous deposits in the liver. Some of the nodules were so small as to be just visible to the naked eye; others varied from the size of a pin-head to that of a walnut. Numerous small nodules were found to be grouped about a larger one which appeared to have formed by the coalescence of the smaller ones. The nodules were firm in consistency and were projecting from the surface (particularly the larger ones) and sharply outlined against the adjacent liver tissue. Some of the smaller ones appeared reddish-brown on account of a thin covering of liver tissue.

On section, the liver was found to be permeated with nodules similar to those seen on the surface. The largest nodule ($1\frac{1}{2}$ inches by 1 inch) situated at the anterior border of the left lobe was surrounded by a distinct fibrous capsule (plate I, fig. 2).

The liver tissue between the nodules is somewhat firm in consistency suggesting an early fibrosis.

The spleen weighed 258 grammes and was twice the normal size. The capsule was uniformly thickened. The surface, of a dark-grey colour, presented numerous discrete firm nodular masses varying in size from a pin-head to a large pea. The largest nodule was situated at the root of the organ (plate I, fig. 3). The spleen was firm, and offered some resistance on cutting. The cut surface showed a deep reddish-brown colour and was studded with nodules similar to those seen on the surface. There were a few enlarged glands at the root of the organ and these were of a greyish-white colour (plate I, fig. 4).

The left lung was deeply pigmented and on the pleural surface the outlines of the anatomical lobules were shown up with beautiful distinctness. The posterior and anterior borders of the upper lobe and the anterior border of the basal lobe showed distinct emphysema with bulbous projections. The entire organ was crepitant. Careful examination of the lung did not reveal any nodule similar to that seen in liver and spleen.

Lymph glands.—At the hilum of the lung there were two distinct masses of enlarged glands. The larger of the two was the size of a walnut, the smaller one the size of an almond. Both were surrounded by a distinct fibrous capsule. The cut surface of the glands presented a mottled appearance, dark pigmented areas alternating with greyish-white areas. The substance of the entire gland was converted into a cheesy mass which however showed no tendency to softening.

Kidneys.—Nothing of note was found.

Histological observations

Liver.—Scattered throughout the section were numerous rounded necrotic areas of varying

size, fairly sharply marked off from the surrounding tissue. The larger ones, as a rule, could be roughly divided into three zones. The central zone composed of necrotic material, under the high power, appeared partly granular and partly homogeneous with evidence of nuclear degeneration such as karyolysis and pyknosis. This necrotic centre was surrounded by a zone of round cells. The outermost zone was made up of a rather dense fibrous tissue. In nodules of smaller size, the fibrous layer was replaced by a zone of hyperaemia, and the centre consisted of a small amount of necrotic material. In the intermediate zone were groups of endothelioid cells between which round cells were seen. The endothelioid cells however were lacking in the follicular arrangement characteristic of a tuberculous follicle. Occasionally, a giant cell surrounded by endothelioid cells was seen.

The liver lobules between the necrotic areas showed a mild degree of passive congestion and infiltration with round cells.

In other areas, there was slight thickening of the capsule on the surface as well as in some of the portal areas.

Spleen.—The capsule and trabeculae were definitely thickened. The Malpighian bodies showed no change. The sinuses were moderately distended with red blood cells. Numerous areas of necrosis of varying size were scattered throughout the section, the margins of which were not sharply demarcated but tended to fade imperceptibly into the surrounding healthy tissue. A few multi-nucleated giant cells with the nuclei arranged around the periphery of the cytoplasm (Langhans type) were found in the necrotic areas. The majority of giant cells were discrete, but some of them were surrounded by a zone of endothelioid and round cells giving an appearance characteristic of a tuberculous giant-cell system.

Lymph gland.—The capsule was very much thickened. The entire lymph gland was necrosed and there were very few collections of lymphoid cells. Multi-nucleated giant cells, some arranged in follicles, were seen.

Lung.—This did not show any pathological change.

Bacterioscopic examination

In sections of liver, spleen and lymph glands stained with Levaditi's silver impregnation method, no spirochaetes were found, but those stained with Gabbett's modification of Ziehl-Neelsen's method showed the presence of acid-fast organisms in some of the necrotic foci.

Comment

The gross appearances of the liver at first sight suggested secondary carcinomatous growths though there was not the characteristic central umbilication, but on histological examination it

was clear that the lesions were of the nature of an infective granuloma. Even though the firm, elastic, cheesy consistency of the lesions and the infrequency of concentric formation of endothelial cells were suggestive of multiple gummata, the absence of definite fibrous capsule and cicatrices, the negative Wassermann reaction, the presence of Langan's type of giant cells, especially in sections of glands and spleen, were all in favour of tubercle. The view might be held that the peculiar nature of the lesions was due to the coexistence of syphilis and tuberculosis but the negative Wassermann reaction makes this unlikely. However, the definite proof of the lesions being tuberculous in nature was afforded by the demonstration of acid-fast bacilli in sections of the liver, spleen, and lymph gland. But the bacilli being very few in number, they were demonstrated only after careful examination of a number of sections. Histologically, the lesions are unusual, in that giant-cell systems, such as are found in tuberculosis, were rare except in the lymphatic gland and the spleen.

It is generally agreed that tuberculous lesions though conforming in their initial reaction differ considerably in their ultimate results and these variations depend upon the age and susceptibility of the individual, the manner of infection and the virulence and dose of the bacilli. It is also well known that tubercle bacilli not infrequently gain entrance to the blood stream from tuberculous lesions and are carried to distant parts where they lead to the formation of tubercles. It appears, in this case, that the organisms which gained access to the blood stream did not give rise to acute general miliary tuberculosis, either because the patient was relatively immune or because the organisms were of low virulence and their number was small. Variations in the size of the nodules seem to indicate that several distinct emigrations of the tubercle bacilli had occurred.

Summary

A case of tuberculosis of the liver, spleen and lymphatic glands is described. The lesions were peculiar in that the large, solitary tubercles in these organs showed no evidence of softening. Histologically, the follicular arrangement of cells characteristic of tuberculous lesions was not well marked, except in the lymphatic glands. Proliferation of endothelioid cells was not a prominent feature. It is suggested that the infection in this case was caused by an organism of a low grade of virulence, which gained access to the blood stream and produced tumour-like masses in the liver and spleen. Acid-fast bacilli were found in sections of the affected organs.

In conclusion, we have to thank Dr. H. S. Hensman, L.R.C.P., M.P.C., Superintendent of the Mental Hospital, Madras, for furnishing the clinical details.

THE INCIDENCE OF PORTAL CIRRHOSIS OF THE LIVER IN VIZAGAPATAM, BASED ON A CRITICAL STUDY OF AUTOPSY RECORDS AND OBSERVATIONS

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We have shown in our previous communications (Tirumurti and Radhakrishna Rao, 1932; Radhakrishna Rao, 1932 and 1933) that portal cirrhosis is the commonest cause of 'decompensated cirrhosis' of the liver in Vizagapatam. In this short paper, we wish to discuss the incidence of portal cirrhosis of the liver in detail.

In a series of 535 autopsies performed in the King George's Medical College Hospital, Vizagapatam, there were 50 cases (9.3 per cent) of cirrhosis of the liver. The material in this paper is based on a critical study of the autopsy findings in these 50 cases.

The causes of cirrhosis of the liver in the 50 cases under discussion are given in the table.

It will thus be seen from the table that, out of the 50 cases, 'decompensated cirrhosis' was present in 40 (80 per cent) while in 10 (20 per cent) ascites was not present. Coarsely nodular cirrhosis of the Laennec's type was found in 26 cases. In 3 cases in this series the portal cirrhosis was a terminal complication of primary splenic anaemia (so-called Banti's disease) while in the rest (23 cases) the portal cirrhosis was primary, with no definite evidence to account for its causation. The diagnosis was made only post mortem in both cases of portal cirrhosis without ascites. The liver was much smaller than normal in all cases of decompensated portal cirrhosis. It was much enlarged in one case of portal cirrhosis without ascites, and the patient died suddenly after an epileptiform fit, while he was undergoing anti-syphilitic treatment for gumma of the floor of the mouth. As pointed out by Rolleston and McNee (1929), 'the liver is larger in cases of cirrhosis in which the disease is latent, and death occurs from some independent cause, than in patients dying directly from cirrhosis'.

The pathological appearances—macroscopic and microscopic—of the liver in most of the cases of decompensated portal cirrhosis were those of the usual 'hob-nailed' type, but in a few cases, the liver was very coarsely nodular, suggesting 'nodular hyperplasia' (Rolleston and McNee, 1929). The hyperplastic nodules were so big as to resemble tumour growth, and were deeply bile stained. In the absence of definite

Table showing the cause of cirrhosis of the liver in 50 cases

(From a series of 535 autopsies)

Serial number	Cause of cirrhosis	DECOMPENSATED CIRRHOSIS		COMPENSATED CIRRHOSIS		Total number of cases	Total percentage
		Number of cases	Percentage	Number of cases	Percentage		
1	Portal cirrhosis ..	23	46	2	4	25	50
2	Syphilitic cirrhosis ..	5	10	1	2	6	12
3	Infantile biliary cirrhosis.	2	4	..	..	2	4
4	Hypertrophic biliary cirrhosis.	2	4	1	2	3	6
5	Perihepatitis and capsular cirrhosis.	1	2	1	2	2	4
6	Associated with malignant disease (primary or secondary) of the liver.	3	6	3	6	6	12
7	Associated with hydatid cyst of the liver.	1	2	..	..	1	2
8	Associated with abscesses of the liver.	..	..	2	4	2	4
9	Primary splenic anaemia	3	6	..	..	3	6

histories in these cases, it is difficult to state correctly whether the 'nodular hyperplasia' is secondary to primary portal cirrhosis, or whether 'nodular hyperplasia' and portal cirrhosis are both sequelæ to subacute hepatic necrosis (the 'toxic cirrhosis' of Mallory, 1911). The microscopical examination of the liver showed marked fibrosis of irregular distribution separating 'adenomatoid' areas of liver cells. The original structure was completely lost in most of the lobules which showed atrophy or degeneration of the liver cells in many places.

Decompensated portal cirrhosis is also seen in children. In one case, the patient was aged about 9 years and showed all the signs and symptoms of portal obstruction during life. At autopsy, the liver was found to be finely granular on the surface and on section, and was deeply bile stained; the left lobe of the liver was markedly contracted, nothing but a small tongue-like process remaining. Microscopically, the appearances were those of typical multilobular cirrhosis. Though the clinical and serological evidences were more in favour of congenital syphilis, the naked-eye and microscopic appearances of the liver were only those of multilobular cirrhosis. Multilobular cirrhosis in children with congenital syphilis has been described (Rolleston and McNee, 1929) and is considered to be probably due to 'some vulnerability or diminished resistance of the liver' left behind after the absorption of the intercellular cirrhosis, predisposing to the disease.

On going through the case-histories of these patients with decompensated portal cirrhosis, we were surprised to find that there was no habit of drinking pure alcohol in any of them. A few patients gave a history of drinking toddy

or arrack, but only in small quantities occasionally, and these cannot therefore be considered to be the chief ætiological factors even in these few cases. The pathological appearances of the liver in these cases are very suggestive of 'toxic cirrhosis' in the sense of Mallory (1911), due to repeated attacks of subacute hepatic necrosis caused by some toxic or toxoinfectious process, the nature of which remains to be determined. The results of the clinical investigation into this type of cases (non-alcoholic type of decompensated portal cirrhosis) are given in detail in a separate paper by the junior author (Radhakrishna Rao, 1933).

In a previous paper (Tirumurti and Radhakrishna Rao, 1933) we have discussed in detail the association of splenomegaly with this type of cirrhosis of the liver.

Varying degrees of fibrosis of the liver were found in malignant disease (primary or secondary) in 6 cases, abscesses in 2, and hydatid cyst in one.

The appearances of the liver in the other cases of cirrhosis do not require special mention.

Summary

A critical study of the recorded observations on autopsies performed in the King George's Medical College Hospital, Vizagapatam, show that the incidence of portal cirrhosis of the liver is rather high (56.0 per cent of all cases of cirrhosis of the liver) in this part of India. Primary splenic anaemia was the cause of portal cirrhosis in a few cases (6 per cent), while in the rest (50 per cent) the causation is far from clear. The pathological appearances of the liver in these cases are described, and it is shown

that in a few cases 'nodular hyperplasia' was seen. Alcohol does not play any part in the ætiology of the disease which is probably of the nature of a 'toxic cirrhosis' (Mallory) due to repeated attacks of subacute hepatic necrosis, caused by some toxic or toxic-infectious process, the nature of which remains to be determined.

REFERENCES

- Mallory, F. B. (1911). Cirrhosis of the Liver. Five Different Types of Lesions from which it may arise. *Bull. Johns Hopkins Hosp.*, Vol. XXII, p. 69.
- Radhakrishna Rao, M. V. (1932). An Investigation into the Causation of Ascites. *Indian Journ. Med. Res.*, Vol. XX, p. 459.
- Radhakrishna Rao, M. V. (1933). An Investigation into 'Decompensated Portal Cirrhosis'. *Ibid.*, Vol. XXI, p. 389.
- Rolleston, H., and McNee, J. W. (1929). *Diseases of the Liver, Gall-Bladder and Bile-Ducts*. Macmillan and Co., Ltd., London.
- Tirumurti, T. S., and Radhakrishna Rao, M. V. (1932). The Role of Dysentery in the Causation of Ascites. *Journ. Indian Med. Assoc.*, Vol. I, p. 423.
- Tirumurti, T. S., and Radhakrishna Rao, M. V. (1933). The Incidence of Splenomegaly in Vizagapatam with Special Reference to its Association with Cirrhosis of the Liver, as Gleaned from a Study of the Autopsy Records. *Ibid.*, Vol. II, p. 269.

CONSTANTS OF COW MILK

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THE standards prescribed for the values of the constants of cow milk under the Acts of the different provinces of India are as follows:—

Act	Specific gravity at 15.5°C.	Milk fat	Milk solids not milk fat	Lactose
Bengal Food Adulteration Act	1028—1030	3.5	8.5	4.4
Calcutta Municipal Act	1028—1030	3.5	8.5	4.4
The United Provinces Prevention of Adulteration Act	1028—1030	3.5	8.5	4.0
Assam Municipal Act	1028—1032	3.5	8.5	..
Bombay Prevention of Adulteration Act .. ..	..	3.5	8.5	..
Madras Prevention of Adulteration Act .. ..	..	3.0	8.5	..
Bihar and Orissa Food Adulteration Act .. ..	..	3.0	8.5	..
The Central Provinces Prevention of Adulteration Act .. ..	..	3.0	8.5	..
The Punjab Pure Food Act .. ..	..	3.5	8.0	..

The Madras Act has also standardized the value of proteins of the cow milk as nitrogen at 0.5 per cent and that of dirt in it at 5 per 100,000 by volume.

It may be remembered here that the standards fixed in England by the Ministry of Agriculture and Fisheries by their Sale of Milk Regulation, 1901, are 3 per cent for milk and 8.5 per cent for milk solids other than milk fat. So the standard prescribed in India for the milk solids other than fat is the same as in England, except in the Punjab where it is lower and that for milk fat is higher in 6 of the provinces but the same in the remaining three, namely, Madras, Bihar and Orissa and the Central Provinces.

We examined 88 samples of pure milk, each sample drawn from a single cow. Two of these samples appeared to be abnormal, the milk solids other than fat in them were 5.9 and 11.5 per cent, respectively; the values of their other constants were:—

Specific gravity at 15.5°C. ..	1021.0	1032.0
Fat	6.5	7.1
Protein	2.1	4.0
Lactose	3.0	6.7
Ash	0.68	0.80

Rejecting these two, we had altogether 86 samples. The results of their analyses are shown in the following table; the figures are the percentage values of the constants. The table also compares these results with those of 643 cows in Scotland given in Currie's *Textbook of Hygiene* (1930).

(a) The probable error of the average, i.e., $0.6745 \times \sqrt{\frac{\text{standard deviation}}{\text{number of samples}}}$ is negligible in respect of all the constants. So though the number of samples is only 86, the group is quite representative of the cow milk in Calcutta.

(b) This is further corroborated by the fact, as will be seen below, that the analyses for fat, solids-not-fat, ash and specific gravity of cow milk supplied to the hospital of the Calcutta School of Tropical Medicine from day to day for a long period have given the same result.

(c) Lastly, it will be interesting to see that the values as well as the relative variability of

the constants of our 86 Calcutta samples agree fairly closely with those of the milk of the 643 Scotch cows; that the average fat values of the milk of our cows is decidedly higher is consonant with the fact that the yield of animals poor in quantity is richer in quality, especially in fat.

We noticed also that, taking the figure for ash in any sample as unity, the quantity of its other two non-fatty constituents were as follows:

Lactose from 5.4 to 8.0 with a mean of 6.8 ± 1.2
Protein from 3.5 to 5.9 with a mean of 4.8 ± 1.1

Therefore the ratio, lactose : protein : ash = 13.6 : 9.6 : 2, practically the same as found by Vieth in European milk, which is 13 : 9 : 2.

Constants	Range	Average	Standard deviation	Relative variability	CONSTANTS OF MILK OF 643 COWS IN SCOTLAND	
					Average	Relative variability
Specific gravity at 15.5°C. ..	1026.4 — 1036	1031.5	1.46	4.02 *	31.5	4.96
Fat	1.9 — 10.6	5.1	1.3	25.5	3.95	19.75
Solids-not-fat	8.0 — 10.8	9.3	0.5	5.4	8.80	5.02
Ash	0.4 — 0.85	0.74	0.05	7.3	0.70	7.21
Lactose	3.72 — 5.72	5.0	0.39	7.8	4.53	8.01
Protein (N×6.38) ..	2.46 — 4.27	3.5	0.39	11.1	3.19	12.22
					(N=0.5)	

* The figure for the specific gravity being taken as 31.5 instead of 1031.5.

Our results might be compared with those of Drs. Dutta and Ghosh of the Calcutta Municipality, and of Crippen (Simpson, 1908); the values obtained by Crippen were slightly less than ours, and in those of Dutta and Ghosh the averages of protein and lactose were both 4.4, and of ash 0.7 and over in all samples.

Constants of cow milk from dairies.—The milk supplied by the milkman is, as a rule, a mixture of the yield of a number of cows and not that of a single cow. As mentioned above we have to examine the daily supplies of milk to the hospital of the Calcutta School of Tropical Medicine. For routine work, we examine them only for their specific gravity, milk fat and milk solids-not-fat. But we made a special study of the milk which was supplied from the 30th October, 1924, to the 10th March, 1927, and

for the purpose included also the estimation of ash in the 1,191 samples of this period. Four showed departure from the rest, the constants in them were:—

Sample	Specific gravity at 15.5°C.	Fat	Solids-not-fat	Ash
1	1025.5	6.0	7.71	0.67
2	1029.0	5.0	8.4	0.57
3	1027.0	4.5	7.8	0.64
4	1032.0	4.8	14.1	0.76

In no. 2 the ash was below 0.6 per cent. The solids-not-fat was below 8.0 per cent in nos. 1 and 3, and above 10.0 per cent in no. 4. The values of the constants in the remaining 1,187 samples were as below:—

Constants	Observed range	Average	Standard deviation	Relative variability
Specific gravity at 15.5°C. ..	1025.5 — 1033.5	1031.4	0.81	2.58 *
Solids-not-fat	8.0 — 10.0	9.02	0.27	2.99
Fat	4.0 — 7.0	5.03	0.46	9.14
Ash	0.60 — 0.80	0.72	0.03	4.16

* Calculated on 31.4 as specific gravity.

The fat was below 4.0 per cent in only 1 out of these 1,187 samples, which is in less than one per thousand, and even in this it was 3.9. In 36 (i.e., 3.0 per cent) of the samples the solids-not-fat was below 8.5 per cent. The number of samples which gave ash at less than 0.66 per cent was also 3.5. In only 11 (i.e., 0.8 per cent) of the samples was the specific gravity less than 1028.

Constants of cow milk according to period of lactation.—Out of the 88 cows, the milk of which we examined separately, we obtained information about the period of lactation of 77. The average values of the constants of these samples according to the period of lactation were found to be as in the following table:—

Period of lactation	Number of samples	Specific gravity at 15.5°C.	Fat	Protein	Lactose	Ash
Under 1 month	3	1033.5	3.8	3.6	5.0	0.79
1 month	5	1031.6	4.4	3.1	5.2	0.69
2 months	12	1031.2	4.3	3.3	5.1	0.70
3 "	11	1032.4	5.4	3.4	5.1	0.72
4 "	11	1031.6	5.2	3.4	5.0	0.73
5 "	11	1031.7	5.5	3.4	5.5	0.77
6 "	11	1031.2	5.3	3.4	4.8	0.76
7 "	2	1028.0	5.6	3.5	4.6	0.73
8 "	6	1030.7	5.2	3.6	4.6	0.73
9 " and over	5	1031.9	5.4	3.8	4.9	0.73

The number of samples of the different periods is very small. Still, without any suggestion at generalization from them, we may notice, (a) that the amount of fat increases after the first three months, so that in the mixed milk of all subsequent months it is always over 5 per cent, and that even in the second month it is over 4 per cent, (b) that the protein in all these groups is over 3 per cent, or in terms of nitrogen over 0.47 per cent, (c) that lactose tends to decrease with age, but in no group is it less than 4.5 per cent, and (d) that in no group is the ash less than 0.7 per cent.

Constants of milk of individual cows.—While the milk of commerce is, as a rule, a mixture of the products of a number of cows, still the sale of milk of single cows is by no means rare. We may refer back to the first paragraph for the standards for the constants which have been fixed in the different provinces. We have already seen the range of the values of these constants in the milk of the 86 cows analysed by us. The number of those samples, the constants of which were below these standards, are shown in the following table :—

Constants	Standard values	SAMPLES WITH LOWER VALUE	
		Number of samples	Percentage to total number of samples
Specific gravity at 15.5°C.	1028	3	3.5
Fat ..	4.0	16	18.6
	3.5	9	10.5
	3.0	2	2.3
Solids-not-fat	8.5	2	2.3
Lactose ..	4.4	4	4.6
	4.0	2	2.3
Protein ..	3.1	11	12.8
	(N=0.5)		
	2.5	Nil	Nil
	(N=0.4)		
Ash ..	0.66	2	2.3

Standard.—(1) *Solids-not-fat*: Richmond (1920) recommends a multiple standard of 8.5 per cent of solids-not-fat, 4.5 per cent of milk sugar, 0.50 per cent of total nitrogen, and 0.70 per cent of ash for judging whether a milk is of genuine composition or not. We have seen above that the relative variability of the solids-not-fat is only 5.4 and those of ash and lactose are only a little higher, viz, 7.3 and 7.7 respectively; we see also that the percentage of samples which had lower values for these three constants than 8.5, 0.66 and 4.0, respectively, are only 2.3. The variability of the protein in the milk of our cows is 11.1; the standard for it has been found

by the Madras Act, too, at 0.5 per cent as nitrogen; but we see that this standard would condemn 12.8 per cent of the samples of our genuine milk from separate cows while none of them had the nitrogen at 4.0 per cent or less; 0.45 would be the value which would probably meet our requirement. It follows that the standards should be :—

for solids-not-fat = 8.5, as at present
 „ ash = 0.66
 „ protein = 2.8, or as nitrogen 0.45
 „ lactose = 4.0, or even 4.4 as at present.

We have seen that the ratio lactose : protein : ash = 12.6 : 9.6 : 2. So we must remember that any upsetting of these relations would point to the milk being abnormal.

(2) *Fats*.—The milk fat is much more variable. But, as in no sample of mixed milk was it found to be less than 4 per cent, except in 1 out of the 1,187 samples examined, and even in that it was 3.9 per cent, any milk with less fat may very well be looked upon with suspicion, and, in any case, a milk with less than 3.5 per cent of fat must be presumed as not genuine, the onus of proving such samples to be otherwise resting with the vendor.

(3) *Specific gravity*.—Three out of the 86 samples, i.e., 3.5 per cent of them, had specific gravity below 1028 at 15.5°C. So any milk with a lower specific gravity is suspicious, while if the specific gravity is 1025, or less, it is certainly adulterated.

For this work, I am indebted to my assistant analyst, Mr. S. K. Banerjee, B.Sc., who helped me by analysing the milk of the single cows, as well as those of the School of Tropical Medicine.

REFERENCES

- Currie, J. R. (1930). *Textbook of Hygiene*. E. & S. Livingstone, Edinburgh.
 Richmond, H. D. (1920). *Dairy Chemistry*. Charles Griffin and Co., Ltd., London.
 Simpson, W. J. R. (1908). *The Principles of Hygiene as Applied to Tropical and Sub-tropical Climates*. John Bale, Sons and Danielsson, Ltd., London.

A Mirror of Hospital Practice

SYPHILITIC CIRRHOSIS OF THE LIVER WITH ASCITES IN A CHILD

(REPORT OF A CASE)

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History.—A Hindu male child aged 3 years and 2 months, belonging to the goldsmith caste, was admitted into the children's ward of the King George Hospital, Vizagapatam, on 5th August, 1931, for swelling of the abdomen of two months' duration. About one year prior

to admission the parents noticed enlargement of the liver and spleen for which various ayurvedic drugs were tried without success. The child's general health was good during the period though it had diarrhoea for about a month prior to admission.

The patient was the sixth child in the family of seven children; the first child died ten days after birth; the fourth and fifth children had enlargement of the liver and spleen, but they improved after treatment. Both the parents appeared healthy and gave no history of previous venereal infection.

The child was fed on breast milk till the end of the 3rd year and it was then supplemented by Nestle's condensed milk and diluted cow's milk. The parents were strict vegetarians in their diet and the same diet was given to the child in small quantities from the end of the sixth month.

Physical examination.—The child appeared to be moderately nourished, the visible mucous membranes were not anemic and there was no jaundice; there was marked oedema of the lower extremities below the knees. There was slight bossing of the frontal prominences and the glands in the posterior triangles of the neck were shotty and elastic on palpation. The child appeared dull and there was difficulty in breathing, on account of the fluid in the abdomen.

The circulatory and respiratory systems were normal except for the pressure effect of the fluid in the abdomen.

The abdomen was markedly distended with free fluid, and prominent and dilated veins were seen over the anterior abdominal wall coursing upwards towards the sides of the chest. The liver, which was palpable (after paracentesis of the abdomen) to about two finger-breadths below the costal margin, was hard, with a finely granular surface and a sharp, hard edge. The spleen was enlarged to three finger-breadths below the costal margin and fairly hard.

Laboratory findings:

(a) **Blood.**—Hæmoglobin, 70 per cent.

Total red cells, 4.95 millions per c.mm.

Total white cells, 4,500 per c.mm.

The blood smear did not show anything abnormal. The coagulation time was 5 minutes and 35 seconds. The formol-gel test was negative in 24 hours. The van den Bergh's reaction was direct, delayed. Hemolysis of red cells (fragility) began in 0.4 per cent saline and was completed in 0.25 per cent saline. The halometer reading of the blood film was 4.6.

The agglutination test with dysenteric organisms was positive for *B. dysenteriae* (Flexner only) in dilutions up to 1 in 128. The Wassermann reaction was moderately positive.

Widal's hæmolytic crisis showed that the liver function was impaired.

W. B. C. count before giving milk	4,500 per c.mm.
W. B. C. count 20 minutes after giving milk	5,200 "
W. B. C. count 40 minutes after giving milk	5,500 "
Rise of W. B. C.	1,000 "

(b) **Urine.**—The physical, chemical and microscopic examination of the urine did not show anything abnormal except that it was very pale and opalescent, with a specific gravity of 1002. Urea concentration test showed that the kidneys were functioning normally.

(c) **Motions:** were greenish-yellow and well formed. Microscopic examination of the faeces showed nothing abnormal.

(d) **Ascitic fluid:** was straw-coloured and clear, with a specific gravity of 1005. The protein content of the fluid was 0.09 gramme per cent and the cell count was 478 per c.mm. The cells were mostly lymphocytes with a few endothelial cells.

The Wassermann reaction of the fluid was strongly positive, while the agglutination test with dysenteric organisms was negative.

On culture, only staphylococci were grown, this was probably the result of contamination.

The guinea-pig into which 20 c.cm. of the ascitic fluid was injected intraperitoneally, died about 7 months after inoculation and on post-mortem examination showed only congestion of all the internal organs.

Progress and treatment.—The patient was afebrile during his stay in the hospital. He was treated with



iodides, inunctions of mercury, and later, intramuscular injections of bismuth. In spite of the administration of diuretics and intramuscular injections of salyrgan, the fluid in the abdomen did not show any diminution, thereby necessitating paracentesis (which was done four times during a stay of 20 days in the hospital). When the patient was discharged from the hospital on 24th August, 1931, his general condition was slightly improved, but the ascites was still a troublesome feature. Unfortunately the patient's subsequent history could not be traced, as the parents did not report again.

Comment.—In this case, the diagnosis of syphilitic cirrhosis of the liver is quite evident from the physical examination, family history and the positive Wassermann reactions of the blood and ascitic fluid. The family history that

the fourth and fifth children had similar enlargements of the liver and spleen is suggestive of this case being one of infantile biliary cirrhosis, but the age, absence of jaundice and the positive Wassermann reactions of both the blood and ascitic fluid are against such a diagnosis. In infantile biliary cirrhosis, the jaundice is generally intense by the time the patient develops ascites.

The effect of antisyphilitic treatment could not be studied in this case, as the patient could not be traced subsequent to discharge from the hospital.

In this case, in addition to the usual signs and symptoms of syphilitic cirrhosis of the liver in children, that of portal obstruction was very marked and constituted the predominating sign.

I wish to express my thanks to Dr. G. Dinker Rao, first physician, and to Dr. P. Kutumbaiah, second physician, King George Hospital, Vizagapatam, for permission to publish these case notes, and to Dr. P. Kesavaswamy, radiologist of the hospital, for the photograph.

A LARGE FIBRO-LIPOMA

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and

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KALOO, Hindu male of the village Borkheri, Tehsil Iklehra, Kotah State, 55 years of age,



was admitted to the Imprey Hospital, Rajgarh State, on 5th February, 1933.

Fourteen years ago, a small lump appeared in his right axilla which steadily grew to the present size. The tumour remained painless and, but for its huge bulk, the patient was none the worse for it.

In length the tumour was 21 inches; in circumference 29 inches. The right nipple had been drawn away from the body and occupied almost the centre of the growth. The consistency was plastic and nowhere cystic. In two places the tumour showed hard nodules, and in three places small ulcerated areas, due to friction with hard objects during sleep. The skin was movable all over it and the veins prominent—one big vein is visible in the photograph. The supraclavicular, infraclavicular and axillary glands were not enlarged.

The ribs and spine were bent towards the right side. In walking about, the patient experienced great difficulty. He was much emaciated, and after 10 days free dieting he weighed 118 pounds.

The tumour was removed under general anaesthesia. It weighed 24 pounds and the patient made an uneventful recovery.

There is no record in the literature available to me of a larger tumour than this.

RADICAL CURE FOR INGUINAL HERNIA UNDER LOCAL ANÆSTHESIA*

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A MOHAMEDAN male, aged about 40 years, was admitted into the dispensary with a right-sided inguinal hernia, of about three years' duration. He was prepared for operation next day.

On the morning of the operation, he was given 1/6th grain of morphia hypodermically after an enema and the same dose was repeated half an hour before the operation.

Four ounces of novocaine solution of a strength of four grains to the ounce was prepared. After boiling for ten minutes two drops of adrenalin solution 1/1000, to each ounce of the solution, was added. An ordinary 10-c.cm. Record syringe with finger bars, two local-anæsthesia needles and one hypodermic needle for intramuscular injection, were used.

The initial intradermal skin weal was made one inch external to and a little above the internal abdominal ring, and from there the subdermal infiltration was made towards and a little above the external abdominal ring and further, towards the upper part of the scrotum. Forty cubic centimetres of the solution were injected here with an ordinary local-anæsthesia needle, which was flexible and three inches long. Another intradermal skin weal was made in the line of and about an inch internal to the anterior superior spine. Here the intramuscular, short and stiff, needle was used. The needle to the length of about three-fourths of an inch was inserted perpendicularly so as to pierce the aponeurosis of the external oblique, which is the anatomical position of the two nerves, ilio-inguinal and ilio-hypogastric. About 30 c.cm. of the solution were allowed to run in slowly so as to saturate these two nerves. The point of the needle was kept moving in all directions. The needle was then gently pushed onwards to infiltrate the peritoneum and when it had gone in just a little distance the patient immediately complained of hyperæsthesia up to the lower part of the thorax, indicating that the needle point had touched some branch of the

* Rearranged by Editor.

twelfth thoracic nerve. The needle was pushed a little further onwards and then directed transversely towards Poupart's ligament, allowing the solution to run slowly all the time. In all 80 c.cm. of the solution was used. The remainder was kept for further use if required.

The anaesthesia appeared to be quite successful as the patient felt no pain throughout the operation, all that he described were sensations of stretching and pulling. It should be mentioned, however, that the hernia was a very simple and straightforward one.

One hour after the operation the patient perspired profusely and was a little bit nervous. A dose of stimulating mixture was given to him.

The patient had no post-operative nausea or vomiting and he was allowed to have both solid and liquid food from the day of the operation.

There was retention of urine which required catheterization, once only, after the operation.

His bowels did not move for three days. One ounce of castor oil was given on the fourth day and after that his bowels were regular.

The dressing was removed on the tenth day for the first time and stitches taken out. The recovery was uneventful and the patient was discharged on the twenty-third day after admission.

A CASE OF HYDROPHOBIA AFTER PREVENTIVE INOCULATION

By **RABINDRA CHANDRA DAS GUPTA, M.D.**
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B. T., a Gurkha, had been bitten by a rabid dog in several places on his hand and leg on the 17th March, 1933.

He came at once to the local dispensary where his wounds were attended to and cauterized with strong carbolic acid. He was sent to the Tropical School at Calcutta (Pasteur Institute) on the next day. He reached Calcutta on the 19th March and treatment was begun on the day following. There he received a full course of inoculations and returned to Morrelganj on the 4th April, 1933, apparently cured. He resumed his duties and for the next seven months he was all right. But on the 4th November last he had an attack of fever in the night. I was called in to see him the next morning. I found his temperature to be 101°F. He had pains about his whole body, and a severe headache. His eyes were bright red. His bowels had not moved for the last two days. I prescribed an alkaline mixture with magnesium sulphate and potassium bromide. At noon of the same day, I was called again as the patient was very excited and restless and shuddered at the sight of water. He presented all the typical symptoms and signs of hydrophobia.

He was sent to Calcutta on the evening of the same day, but he died on the way on the next morning at about 7 a.m.

The interesting feature of this case is that the man had a full course of preventive inoculations soon after the bites, yet he died of hydrophobia after seven months.

(Note.—There are certain points in this case that call for comment. The writer does not state whether or not there was any evidence that the patient had been bitten subsequently to receiving treatment. Deaths later than three months after treatment are extremely rare, and the League of Nations Health Organization have laid down six months as the safe period. In

the whole history of Pasteur Institute treatment only very few instances of such late development of symptoms have been reported. Dr. M. J. Nicholas, officer in charge of the Pasteur Institute at the School of Tropical Medicine, very kindly looked up the records of this man; the following notes are extracted therefrom:—

An unprovoked attack was made on the patient by a dog that was apparently rabid and was afterwards killed; he had 11 bites on his hands and arms, six of which were deep; he received a full course of 14 days' treatment; his death had not been reported.

We take this opportunity of pointing out that it is of the utmost importance that, whenever a patient who has received anti-rabic treatment dies, the fact should be reported to the officer in charge of the Pasteur Institute where he received treatment; the records collected in these institutions are of great scientific value, as it is on them that decisions regarding the efficacy of the different forms of treatment are based.—EDITOR, I. M. G.)

UNSUSPECTED CHOLECYSTITIS

By **M. N. SARDANA, M.D.B.S., L.R.C.P., M.R.C.S., D.T.M.**
D.O.M.S., F.R.F.P.S.
Chief Medical Officer, Bharatpur State

A HINDU woman aged about twenty-six years asked me to examine her while she was in hospital with her child who was being treated.

A slightly movable pear-shaped tumour about the size of the closed fist was present in the right lumbar region. This had been present for three or four years but had caused no discomfort or pain.

After a considerable amount of questioning the woman gave an indefinite account of attacks of pain, possibly of the nature of renal colic. Her urine was normal and exertion pycnography revealed no abnormality of the kidneys. After brisk purging the tumour was found to be freely movable from one side of the abdomen to the other.

A provisional diagnosis of mesenteric tumour was arrived at and laparotomy decided upon. On opening the abdomen by a right paramedian incision, the mass was felt in the right lumbar region. It was freely mobile and was brought out through the abdominal wound. It was found to be a greatly distended gall-bladder, hanging from the under surface of the liver. A stone was felt embedded at the junction of the cystic duct. The bladder was tapped and about 6 ounces of mucus-like fluid removed. Four stones were removed from the fundus. The one in the cystic duct could not be removed except by cutting directly over it. The gall-bladder was then excised, the common bile duct probed and the laparotomy wound closed. A stab puncture was made in the right loin for drainage.

The drainage tube was removed after 48 hours.

The patient made an uninterrupted recovery except for an attack of malaria on the 8th day after the operation.

The case was interesting on account of the absence of any symptoms.

I have to thank the subordinate staff of the Victoria Hospital, Bharatpur, for their co-operation in the investigation and treatment of the case.

SYPHILITIC CIRRHOSIS OF THE LIVER ASSOCIATED WITH GLYCOSURIA IN A CHILD

(REPORT OF A CASE)

By M. V. RADHAKRISHNA RAO, M.B., B.S.

Research Fellow, Andhra University

(From the Department of Pathology, Medical College,
and King George Hospital, Vizagapatam)

History.—A Hindu male child, aged 20 months, was admitted into the children's ward of the King George Hospital, Vizagapatam, with a swelling of two months' duration in the upper part of the abdomen.

The child was healthy and active till the end of the 18th month, after which it had fever for about a fortnight and the mother noticed that the upper part of the right side of the abdomen was prominent and hard. The child gradually lost weight from that time onwards.

The patient was the only child of the parents. The father of the child was a ryot by occupation and gave no history of any venereal disease. The mother was in good health and showed no clinical manifestations of syphilis and gave no history of abortions or miscarriages.

The child was fed on breast milk supplemented with diluted cow's milk from the end of the 3rd month. It was given small quantities of rice from the end of the 18th month; sweets and biscuits were given to prevent it from crying.

Physical examination.—The child was moderately nourished, peevish and irritable. There was no oedema in any part of the body. All the visible mucous membranes were normal, except that there was a slight icteric tint of the bulbar conjunctiva. The skin was dry and it lay in folds over the thighs and buttocks. The posterior cervical, inguinal and epitrochlear glands were enlarged and shotty. The head was dolichocephalic, with slight bossing of the frontal eminences. Dentition was normal; temperature, pulse and respiration were normal.

The chest was symmetrical and normal in shape. The bases of both lungs showed diminished resonance and on auscultation a few râles and ronchi were heard. The first sound of the heart was replaced by a systolic murmur in all the areas and the second sound was reduplicated at the base. The pulse was regular, slightly rapid, with good volume and tension.

The upper part of the right side of the abdomen was prominent and a few veins were seen over it. The liver was enlarged to a hand's breadth below the costal margin, hard and finely granular on its surface; the lower edge was sharp and hard. Also the spleen was enlarged to a hand's breadth below the costal margin and was hard. There was no ascites. The appetite was voracious and the bowels were regular.

The epiphyseal ends of the long bones were normal and showed no enlargement. All the deep reflexes were normal.

Laboratory findings:

(a) **Blood.**—The blood-picture was normal except for slight anisocytosis. The van den Bergh's reaction was direct, biphasic. The agglutination test with dysenteric organisms was negative. The Wassermann reaction of the blood was weakly positive. The hemolysis of the red cells (fragility) began in 0.4 per cent saline and completed in 0.3 per cent saline.

(b) **Urine.**—This was clear, straw-coloured, strongly acid in reaction and showed a specific gravity of 1004. Albumin, phosphates, urates, bile salts, bile pigments, indican, urobilinogen and urobilin were absent. The urine reduced Benedict's solution and on quantitative estimation the sugar content was 0.43 per cent. The nature of the reducing sugar was found to be glucose. There was no acetone in the urine.

Microscopic examination of the urine showed no cells, casts or crystals.

(c) **Fæces.**—The stools were solid and brownish in colour. Microscopical examination showed round-worm and whip-worm ova; no amœbic cysts or Charcot-Leyden crystals were found. The biochemical examination for the fat content of the fæces gave the following results:—

Total fat, 52.00 grams per 100 grams by weight of dried fæces.

Unsoaped fat, 24.00 grams per 100 grams by weight of dried fæces.

Free fatty acids, 22.43 grams per 100 grams by weight of dried fæces.

Neutral fat, 1.57 grams per 100 grams by weight of dried fæces.

Combined fatty acids, 28.00 grams per 100 grams by weight of dried fæces.

Progress and treatment.—The patient was given potassium iodide internally, together with daily inunctions of unguentum hydrargyri. He was discharged from the hospital at the request of the parents after a stay of a fortnight, during which period he showed no improvement. The parents were advised to bring the child to the out-patient department for further treatment, but, as they did not report again, the further history could not be traced.

Comment.—The clinical picture in this case is fairly typical of congenital syphilis. The child was very troublesome and a thorough investigation could not be carried out. It is therefore difficult to explain the cause of the glycosuria. The total fat content of the fæces is increased; this is due to an increase in the fatty-acid fraction, showing that there is defective absorption of fats. The pancreatic function, so far as the fat digestion is concerned, appears to be good. Though the liver plays an important rôle in the carbohydrate metabolism of the body, glycosuria of hepatic origin is very rare in hepatic disorders. In the absence of a complete investigation it is difficult to say whether the glycosuria in this case is of hepatic or pancreatic origin, though the laboratory findings are more in favour of the former than of the latter.

I wish to express my thanks to Dr. G. Dinker Rao, first physician, and to Dr. P. Kutumbaiah, second physician, King George Hospital, Vizagapatam, for permission to publish these case notes.

A CASE OF RESISTANT PROTOZOAL DYSENTERY

By R. M. LLOYD STILL, M.R.C.S., L.R.C.P.
CAPTAIN, I.M.S.

and

JEMADAR MANOHAR LAL DANG, D.T.M., I.M.D.
(From the Indian Military Hospital, Dehra Dun)

A PATIENT aged 22 years of 19th Mountain Battery, Royal Artillery, Dehra Dun, was admitted to the Indian Military Hospital, Dehra Dun, on the 5th August, 1933, with the following complaints:—

Frequency of stools containing blood and mucus, abdominal discomfort, slight tenesmus, no vomiting or fever. Duration 3 days.

History.—Patient states that he commenced to have abdominal pain on the afternoon of the 3rd August, and passed a loose stool at 4 p.m. without any blood or mucus. He did not feel sick and was at work till the next morning when he reported sick and was given palliative treatment consisting of a carminative mixture and saline. On the morning of the 5th August, his symptoms became worse and he was admitted to hospital.

Previous history.—Patient does not give any history of dysentery prior to this attack.

Condition on admission.—He is a thin, spare and slightly anæmic man, complains of pain in abdomen along colon, tenderness at hepatic and splenic flexures and a little at cæcum. Stools number 6 to 8 in 24 hours with slight griping. No fever and pulse rate 74 beats per minute, no enlargement of spleen or liver. Other symptoms:—Nothing abnormal could be elicited.

Stool examination.—Quantity about 2 ounces, smell offensive, blood and slight mucus with faecal matter. Reaction neutral.

Microscopic examination.—

Exudate—nil.

Numerous red blood cells.

Vegetative *Entamoeba histolytica* seen in large numbers.

Culture.—No organism of the dysentery group isolated.

Treatment.—(1) Castor oil and tincture of opium.

(2) Absolute rest in bed and hot water bottle to abdomen.

(3) Emetine injections, one grain daily.

(4) Bismuth carbonate, one drachm three times a day.

Progress.—On the 18th August stools formed, course of emetine completed and patient convalescent, placed on light diet.

On the 20th August, patient passed considerable quantity of blood in stools, no mucus.

Examination of stools.—

Exudate—nil.

Red corpuscles—numerous.

Pus cells—nil.

No vegetative amœbæ or cysts seen.

Culture.—No organism of dysentery isolated.

Treatment.—(1) Put on 'No diet'.

(2) One ounce of castor oil.

(3) Saline mixture, two drachms every two hours.

On the 22nd August number of stools 10, very offensive and containing trace of blood.

Microscopic.—Reaction—alkaline.

Few pus cells present.

Red corpuscles present.

Exudate—indefinite.

No vegetative amœbæ or cysts seen.

Culture.—No organism of dysentery group isolated.

24th August.—Patient complains of pain and heaviness in abdomen, could not sleep at night. Stools very loose, 16 to 20 in number, containing mucus and blood, looking very ill.

Stool examination.—Large number of vegetative *E. histolytica* seen.

Treatment.—(1) Yatren pills. One three times a day.

(2) Rectal lavage with 200 c.cm. of two per cent solution of Yatren once daily preceded by a wash out with sodium bicarbonate solution.

26th August.—Condition of stools improved. Alkaline lavage brought away a considerable quantity of mucus in flakes; pain much relieved.

1st September.—In spite of yatren irrigation, mucus still persisting; no vegetative amœbæ in stools. Patient still feeling very weak, has no appetite and refuses to take milk. Yatren lavage replaced by eusol solution.

3rd September.—No abdominal symptoms but generalized pain in body and limbs, but no swelling in any joint. Patient is anæmic and still has no appetite, stools loose, decreased in number, slight mucus but no blood.

9th September.—Condition much improved, stools clear, no mucus or blood, patient very weak, no appetite, general pain much less.

Treatment.—(1) All treatment stopped.

(2) Stovarsol 1 tablet 4 grs. once daily for 12 days.

16th September.—Stools well formed, of yellow colour. No constipation, appetite much improved, no abdominal complaint.

24th September.—Patient is now in convalescent stage with general health improving daily.

Microscopic examination of stools.—No vegetative *Entamoeba histolytica* or cysts seen on repeated examinations.

This case presents certain unusual features and is therefore of interest. After apparent cure with emetine and bismuth there was a relapse and the patient became seriously ill. Yatren was used both by the mouth and per rectum for the treatment of the relapse with apparent benefit, but the patient still passed a considerable amount of mucus until the substitution of eusol for yatren as a rectal lavage finally cleared up this condition, and a course of stovarsol, after cure was complete, greatly improved the patient's general condition.

We are greatly indebted to Lieut.-Colonel D. C. V. Fitzgerald, M.C., I.M.S., Officer Commanding, Indian Military Hospital, Dehra Dun, for permission to publish this case and for his advice.

AN OVARIAN DERMOID WITH TWISTED PEDICLE

By T. C. GOPALAN, L.M.P.

Sub-Assistant Surgeon, Civil Hospital, Syriam

A BURMESE female, aged 14, was admitted into the Civil Hospital, Syriam, on 17th October, 1933, for treatment of a tumour protruding from the anus. She stated that she had been passing blood and mucus for about four days and in the morning a lump had come out while at stool. She made no complaint of any abdominal pain nor of any vomiting.

On examination a tumour roughly circular and about the size of a cricket ball on which there was a tuft of hair about 4 inches long, was seen protruding from the anus. On rectal examination a pedicle about the thickness of a finger was felt. It was stretched and its attachment could not be reached. Both tumour and pedicle were reddish-black in colour giving the appearance of strangulation.

General condition.—Temperature was 101°F. otherwise her general condition appeared normal and there was no tenderness or rigidity of the abdomen.

On the morning of the 19th the tumour was examined under spinal anaesthesia by the civil surgeon, Syriam, and as even then the attachment of the pedicle could

not be located, it was ligated and the tumour removed. It was noticed that after removal of the tumour the stump receded and could not be felt. About 6 hours later the patient developed signs of severe shock and, in spite of all treatment, she died at midnight.

A post-mortem examination revealed the presence of a small amount of pus in the pelvis. The gangrenous stump was found to be attached to the left ovary and was inside the peritoneal cavity. The pouch of Douglas and posterior surface of the uterus formed a pocket with a blackened and gangrenous surface, and on the anterior surface of the rectum, which formed the posterior wall of this cavity, there was a perforation through which the tumour must have been extruded during the muscular efforts at defaecation.

The tumour was in the form of a multilocular cyst containing a dark-coloured fluid and having a thick wall bearing a tuft of hair, pieces of cartilage, and a rudimentary tooth projecting on the outside.

I am indebted to Dr. R. H. Liscombe, the civil surgeon, Syriam, for kindly permitting me to publish the notes of this case.

DATE STONE CAUSING APPENDICITIS

By SATYAPRIYA MOZUMDAR, M.B. (Cal.),
F.R.C.S. (Eng.)

Honorary Surgeon, Purulia Sadar Hospital, Purulia

A young adult was admitted to the hospital with all the signs and symptoms of an acute appendicitis. The duration of the disease was six days before admission. The patient looked ill—but it was difficult to decide whether the abscess was being shut off by nature, and whether by interference we would just disseminate the pus. After 48 hours in the hospital, however, operation was decided upon.

The abdomen was opened by McBurney's incision and anteriorly nothing abnormal was found, the healthy caecum and ileum nicely covering up the abscess behind them. On gently exploring with the fingers behind the caecum after lifting up an adherent loop of ileum, the appendix was found in the retro-caecal position with the tip directed upwards. While exploring the abscess cavity, a little grating substance could be felt. On further investigation, it was found to be a foreign body lying free in the abscess cavity. It was extracted with some difficulty and was found to be a whole date stone not altered by the long process of digestion it had gone through. It was argued that it might be an appendicular concretion but it was definitely proved otherwise.

The perforated stump of the appendix was just ligatured—its thickness was nearly that of the small intestine—nothing else being practicable the abscess cavity was drained.

The patient made an uneventful recovery. On being asked, she could not remember ever having swallowed a date stone—so the interval between this and the onset of the trouble could not be ascertained.

A CASE OF HORNY PAPILLOMA

By D. N. GUPTA

Teacher of Surgery and Deputy Superintendent,
General Hospital, Cuttack

N. L., aged about 60 years, H. M., a cultivator, was admitted into Arrah Sadar Hospital on the 1st February, 1928, for treatment of a horny papilloma.

The horn started as a small, hard and tough warty growth on the right side of the chest a little below the clavicle and close to the anterior fold of the axilla. As the growth increased in size, the patient noticed



horny changes taking place. These changes began at the tip and spread towards the base and at the same time the growth was becoming curved. At the time of admission it was three inches in length and resembled the horn of a goat. There was no specific history.

The man had generalized leucoderma.

The papilloma was removed and healing was uneventful.

The specimen is preserved in the museum of the Cuttack Medical School.

ADDENDUM

THE AETIOLOGY AND TREATMENT OF RETINAL DETACHMENT

(January number, pp. 4-7)

Bibliography

- Arruga, H., *Arch. de Otol. Hist. Amer.*, May 1933.
Blatt, N., *Arch. J. Ophth.*, 1931. Davids, H., *Arch. J. Augenh.*, 1932. Gonin, J., *Annal. d'occul.*, 1931. Guist, G., *Ztschr. f. Augenh.*, June 1931, and *Klin. Monatsbl. f. Augenh.*, June 1932. Lindner, K., *Arch. J. Ophth.*, 1931. Larsson, S., *Arch. Ophth.*, May 1932. Lobeck, Graefe's *Arch.*, 1932 v. 128. Safar, H., *Klin. Monatsbl. f. Augenh.*, June 1932. Shapland, C. D., *Trans. Ophth.*, U. K., 1932. Sourdille, *Arch. de Otol. Hist. Amer.*, May 1932. Weve, H., *Klin. Monatsbl. f. Augenh.*, 1932.
(Through a misunderstanding, this bibliography, which was received from the author in this form with the typescript of his paper, was omitted.—Editor, I. M. G.)

Indian Medical Gazette

FEBRUARY

WASTE, WEALTH, AND HEALTH

ENVIRONMENTAL cleanliness in its relationship to either comfort or health must have been a comparatively late development in human history. Not until the easier gregariousness of early human life was abandoned for larger social and communal aggregation with permanent or semi-permanent locations, could the matter have obtruded itself either on man's intelligence or his senses. Such communities further could hardly have existed till the comparatively advanced age when man had become more or less agricultural, and had even begun to domesticate certain species of animals. It is unlikely however that in these early communities environmental or 'district' cleanliness was prompted either by fastidiousness of the senses or by any apprehension of danger to health. It is true that the interests of health are often identical with those of common physical convenience; 'kitchen middens' and the large crude drains and sewers of our earlier and later ancestors were undoubtedly prompted by considerations of the latter nature.

Communal agriculture is probably the oldest of human institutions and had its beginnings in some far-off prehistoric Aryan motherland, from whence it was conveyed and diffused by successive streams of civilizing Aryan migration. Later, it became the land custom throughout Europe, and is eminently still present in India among populations perhaps first in descent from the village communities that invented it.

The discovery, that animal refuse is wealth in agriculture, must also be immensely old and must have led to a much quicker removal of much human and animal refuse that would otherwise have been tolerated in the vicinity of villages. This discovery, ancient as it is, even yet has not given to mankind more than a small share of the benefits that it is capable of yielding. The connections of cleanliness of the surroundings of human communities, with agriculture and food supplies, and with human health, are thus old and intimate. They have been lost sight of at various periods of history and it is part of our present purpose to remind our readers of their fundamental inter-relationship; and in particular to draw attention to the very important work in this connection which has been carried out in India, work which should happily combine the benefits of modern science and the advantages of ancient village life.

Real environmental cleanliness in relation to health began in quite modern times with the

work of the English sanitarians and humanitarians in the early part of the 19th century. The appalling conditions of the industrial revolution led to a belief in the principle that poverty and disease were chiefly the result of bad environment, and led also directly to the establishment of central and local sanitary authorities, specifically created for the purpose of environmental improvement. Rubbish and filth were held to be the direct progenitors of disease and as such became anathema to the newly-created inspector of nuisances and the medical officer of health. The success of this policy appeared to establish the truth of the principle. So great was the belief in the generation of disease by filth, that no less a personage than Miss Florence Nightingale is said to have been able to distinguish by the appearance and smell of fermenting heaps of rubbish, which heap would generate the small-pox contagion, which cholera, which dysentery, and so forth.

The *Report on the Sanitary Conditions of the Labouring Population of Great Britain* in 1842 stated that human excreta should be removed as quickly as possible from its place of deposition and preferably by means of water. The water-closet became almost a fetish of the sanitary mind and the disposal of huge volumes of water-borne sewage and of accumulations of heaps of town refuse became the dominant problems of environmental sanitary science in England. The disposal of town refuse is still an unsolved problem; a recent report on the disposal of London's refuse revealed the fact that the old 'kitchen middens' of the ancients had merely been replaced by hills of rubbish above ground. The problem of sewage treatment was more successfully attacked.

The discovery that septic-tank action would rapidly break down the organic elements of domestic sewage was the first step in progress. It dominated sewage treatment for nearly 30 years, however, and blinded nearly everyone to the fact that real purification lay in oxidation and aerobic action, and not in anaerobic or septic action.

There was, however, an undercurrent of thought that water-borne sewage systems were wasteful, and it is said that Victor Hugo, the poet, walrus-like, 'wept to see such quantities' of nitrogen going seaward in the Seine. Sewage farms became fashionable, but unsuccessful. The chemistry of plant life and the nitrogen cycle were imperfectly understood.

Advances came from two directions. Firstly, the relationship of mineral matter and organic matter to soil fertility was closely studied. Liebig in 1840 led the way to the utilization of 'artificial' manure of mineral composition in the form of nitrate, phosphate and potash. Later investigation showed that this was not the whole story, however, and the part played by the micro-organisms of the soil in crop

production began to be studied and understood. Here, as in many other departments of human activity, experience and empiricism had fore-shadowed scientific investigation and explanation. The Chinese had for ages realized the value of animal excreta for the betterment of crops. They were, moreover, the first to grasp and act upon the master idea that the growth of a crop involves two separate processes, firstly, the preparation of vegetable and animal wastes which must be done outside the field and, secondly, the actual growing of the crop. The Chinese do not put crude night-soil or sewage on the soil; they treat it first in pits. These two definite steps may be scientifically stated as (a) the formation of 'humus' and its incorporation into the soil, and (b) the slow oxidation of this product accompanied by the production of nitrogen in a form available to plant life. Both these processes are the result of fungal and bacterial action. The first is an intense process and should take place outside the soil. If it takes place in the soil, it is bound to interfere with the development of the crop. For this reason the continuous treatment of soil with crude sewage for agricultural purposes is difficult and usually unsuccessful in actual practice.

Other advances came from the side of sewage purification. It was realized that the septic-tank system resulted in a great loss of nitrogen in the form of gas by fermentation. Attempts were made to cut out the anaerobic process by direct oxidation by blowing air through sewage. Nothing seemed to happen, however, and the experiments were abandoned. The perspicuity and persistence of Dr. Gilbert Fowler, however, led to a repetition of this work. He showed that long-continued aeration of sewage led to its ultimate purification by aerobic organisms alone, with a resultant brown 'sludge' in which the aerobic organisms resided. This sludge could be prepared and collected, and used in the requisite quantities for treating raw sewage. Fowler claimed that by this method nitrogen loss was avoided, and that nearly all the original nitrogen was conserved, both in the effluent and in the sludge, in a form readily available for plant life. The sludge therefore corresponds to the 'humus' of the drier method of production. Fowler's contentions have been upheld and the difficulties of taking advantage of his method of sewage treatment for agricultural betterment have been mainly mechanical. The residual sludge is bulky, wet and difficult to handle. These difficulties have been partly, but not completely, overcome. The more modern treatment of sludge by digestion and gas production, however, threaten to oust the agricultural side of Fowler's process. In America and England definite monetary success has been reported from the activated-sludge process. In India the installations have successfully achieved their object of purification, but the agricultural side

has not been very successful. One very important result of the activated-sludge system is its germicidal action. Stewart and Ghoshal, working in the All-India Institute of Hygiene, Calcutta, showed that in the end-result typhoid and cholera germs are definitely destroyed by the activated-sludge process, while there is also a very striking reduction in the numbers of intestinal *Bacillus coli*. This result is a striking contrast to the usual treatment of sewage by septic tanks and trickling filters. The same workers showed that the intestinal flora of the effluent of septic tank and filter treatment is practically identical with that of raw sewage, and typhoid bacilli have on numerous occasions been isolated from such effluents. In the matter of health, therefore, the principle of the activated-sludge process represents a very definite advance.

On the treatment of vegetable waste for agricultural purposes, a tremendous amount of work has been done in Great Britain, in the United States and in India. The treatment of vegetable waste in pits is very old. Modern science has shown the breaking down of lignins and celluloses to be due to the action of fungi and to various aerobic bacteria. Both these classes of organisms demand large amounts of available combined nitrogen and phosphate as food and a favourable reaction (i.e., alkaline). 'Adco' is a patented product devised at Roehamptonstead containing the requisite nitrogen and phosphatic food for the fungi and bacteria, and a lime base for the neutralization of acidity. 'Adco' hastens the formation of humus, or compost as it is called, from vegetable waste by promoting intense fungal and microbial action. In India, excellent and pioneer work at Indore has shown that the urine and dung of cows can adequately, and far more cheaply, replace the 'Adco' mixture. Details of this work are given in Howard and Wad's book, *The Waste Products of Agriculture*, which most of those interested in the matter will have read.

From Fowler, however, we believe came the first suggestion that activated sludge could usefully replace 'Adco' in the preparation of compost, and later that raw night-soil could equally well fulfil the same purpose. Experiments on a small scale by Fowler and others showed that the suggestion was quite feasible. In our present issue we publish the results of two large-scale experiments at Indore and Mysore respectively, where the compost for agricultural purposes is prepared in large amounts from town waste (mainly vegetable) and night-soil. The authors of these papers would probably hold that the work is no longer experimental but a demonstrated fact.

On the agricultural side, the evidence and the authority of the authors are sufficient testimony that this is so. From the economic side also, it would appear certain that if the processes are designed, conducted and supervised on the

lines described by the authors of the papers in this issue, such undertakings should result in a profit.

The subject deserves the closest consideration and attention from administrators, civil, medical and public health. In the ordinary municipality in India we have as a rule the 'removal' or 'conservancy' system of night-soil disposal, and in the majority of villages nothing at all in the way of any organized conservancy. In both cases there is danger to health, and nuisance and waste. In the ordinary Indian towns, the nuisance and danger of conservancy exist chiefly at three points, viz., in the privies (both public and private), in the removal of crude night-soil through the streets and lanes by buckets or carts, and at the trenching ground. The last named is a source of nuisance and danger by breeding flies, and is usually un-, or but slightly, remunerative. The utilization of night-soil for compost would remove these drawbacks. We are assured by the authors that pathogenic bacilli would be destroyed in the fermentation process. This is probable but specific work similar to that done on the activated-sludge process seems necessary. The privies and the street cartage would still remain, however, and these are by no means the least of the disadvantages and dangers of the ordinary conservancy system. Then there is the question of supervision. The process is based on fairly well-defined scientific principles which the supervisors should understand and see

carried out. We agree that it should not be impossible to train a sanitary staff to carry out the process with understanding, but the state of a compost factory utilizing town refuse and night-soil run badly or carelessly can be readily imagined. There is also the question of salability of the compost product. At Mysore there seems to have been no difficulty in disposing the compost at a profit, but we have no assurance that this will continue indefinitely. There is still a prejudice in the mind of the Indian cultivator against handling products made from human night-soil. Mr. Brayne in the Punjab managed to achieve a certain success with his village refuse pits, but a great part of the result was, we believe, due to his personal influence and not to the conviction of the villagers in the efficacy or benefit of the measure, nor to their willingness or desire to try new and economical methods. We think the authors of the two papers in our present issue have proved the feasibility and the advantages of their methods and we hope that the subject will receive the closest attention of agriculturists and sanitarians throughout India. Further trial and experiment are probably necessary under the varying conditions of Indian village and town life, but we feel convinced that, could the methods described be put into practice, they would add much to the health and prosperity of millions of our Indian people.

A. D. S.

Special Articles

ORGANIC MANURE FROM STREET REFUSE AND NIGHT-SOIL AT MYSORE CITY, INDIA*

By J. J. MIELDAZIS

Sanitary Engineer

THE development of efficient methods of refuse and garbage disposal have not kept pace with the perfection of sewage disposal processes now commonly adopted throughout the world. The most common methods of refuse and garbage disposal are dumping on land or at sea, feeding to hogs, incineration, and reduction. Other methods include the pulverizing of refuse by machinery prior to sale as fertilizer (Soper, 1931) and the Beccari system of fermenting mixed refuse into a form suitable for sale as fertilizer (Hyde, 1932). But, with few exceptions, none of these methods produce revenue returns commensurate with the amounts invested

for disposal plants. It may safely be said that the disposal of street refuse is a costly obligation to any community.

In an agricultural country like India, the manurial value of a mixture of street rubbish and night-soil is recognized to such an extent that agriculturists make periodic trips to the cities for the collection of these ingredients. In some cases, municipalities are able to get revenue returns by contracting the collection of refuse of certain portions of the city to agriculturists in need of the fertilizer. In India garbage is almost unknown. The street refuse collected consists mainly of straw, paper, coconut husks, bits of clothing, cardboard, leaves, weeds, stones, broken pottery, tins, glass, and fine dust, together with an appreciable amount of night-soil which finds its way to the rubbish bins. The agriculturist loads his cart with alternate layers of this heterogeneous mass of refuse and night-soil and carts the mixture to his fields, where it is formed into piles and allowed to decompose for a period of four to six months. When it is sufficiently broken down into an odourless humus mass, it is used as

* The experiments and observations referred to herein were conducted with the support and under the auspices of the International Health Division of the Rockefeller Foundation and the Government of Mysore, India.

fertilizer on his fields. This process dates back forty centuries to the early methods of composting in China (King, 1911). Japanese agriculturists have been taught how to conserve the fertilizing value of night-soil for use in their fields (Smith, 1908). Dr. Gilhert J. Fowler (1930), after considerable experimenting in India, was able to compost street rubbish with cow-dung and night-soil solutions at Nasik, Cawnpore, and Bangalore. Howard and Wad (1931) developed the Indore method of composting at the Institute of Plant Industries at Indore.

After a study of these experiments and consultation with Dr. Fowler, the composting of street rubbish with night-soil was carried out at Mysore city. Mysore city, the capital of Mysore State, India, with a population of 107,042 and covering ten square miles, lies at an elevation of 2,500 feet and is situated about three hundred miles west of Madras city in south India. The average annual rainfall is 29.75 inches. It starts with early showers in April and May which lead to the south-west monsoon rains during June, July, and August. A few showers occur during the north-east monsoon of October and November.

The conservancy of street rubbish and night-soil in Mysore city prior to July 1931 was typical of most Indian cities of its size. The Mysore City Municipal Regulations prescribe that :—

'Dust, dirt, dung, ashes, garden, kitchen, or stable refuse or filth of any kind or any animal matter or any broken glass or earthenware or other rubbish, or any other thing that may be a nuisance shall not be deposited in any street, drain, or open space except at such places in such manner and at such hours as shall be fixed by the Municipal Council.'

In order to facilitate the collection of street rubbish and refuse mentioned above, the municipal council provided a number of dust bins in which such refuse was to be deposited by the householders.

The transportation of the collected refuse to the municipal dumping grounds presented quite a problem to the municipality. The bullock carts used for collecting the rubbish were unsightly and were continuously breaking down, leaving the load of street rubbish, with its inevitable deposits of night-soil, along the city streets until repairs could be undertaken or an empty cart obtained to remove the load. The sides of these carts were composed of woven bamboo, generally patched with old gunny sacks. Owing to the speed of the bullock and the distance to the dumping ground on the outskirts of the city, it was necessary to establish temporary dumping stations within the city to which the bullock carts transported their loads. Motor lorries of the city picked up the rubbish from the temporary dumping grounds and made the long trip to the main dumping ground.

The conditions around these temporary dumping grounds may well be imagined. There was no impervious floor and there was always some refuse left on the ground. They presented ideal places for the collection and breeding of flies.

The latrines in this city present a variety ranging from the popular open-pit type, or a conservable latrine in various stages of disrepair, to a flush latrine connected with the city underground system. Despite Mysore city's 67 miles of underground sewage line, the number of flush latrines within the city prior to June 1931 was less than a hundred. The usual type of conservable latrine consists of a squatting slab with a hole, underneath which is a basket about 18 inches in diameter and about 6 inches deep. The basket is provided with a lining of palas-kino leaves sewed together to form a mat about a foot in diameter. These leaves are used by the high-caste Brahmins instead of plates, and after meals they are discarded into the rubbish bins where they are collected by the scavengers. The scavenger empties the night-soil with the leaf lining and covering of ashes or dirt into the night-soil cart and replaces the basket with a new leaf lining.

The transportation of night-soil was even more precarious than the transportation of street rubbish. This important phase of sanitation was executed by a number of agriculturists partially subsidized by the municipality for carting away the night-soil collected by private scavengers and municipal sweepers from pit latrines, conservable latrines, and open spaces within the city. These agriculturists were paid Rs. 5 per month for a double bullock cart and it is quite obvious that their visits to the city were prompted more by the value of the manure collected than the compensation received from the municipality. As a result, the conservancy in the city had to suffer when their agricultural duties kept the collectors in their fields. It was impossible to enforce regular attendance and as a result some sections of the city were not conserved for days on end. The householder who employed a private scavenger was more fortunate; he had his conservancy carried out even though the contents of the latrine finally reached one of the municipal rubbish bins.

In June 1931, the municipal council, with the aid of substantial government loans and a two per cent sanitary cess, undertook the conservancy of street rubbish and night-soil. New rubbish and night-soil carts of approved design were built to replace the rickety carts in use. The municipality was then confronted with the problem of the proper disposal of the night-soil conserved from the city.

Experimental work in composting had been begun at Mysore city in January 1931. Street rubbish collected from the city was formed into small heaps and treated with an emulsion made up of one part night-soil and four parts water.

The rubbish was completely decomposed in six weeks and on analysis was found to contain:—

Moisture	..	12.73	per cent
Organic matter	..	17.06	" "
Phosphoric acid	..	0.87	" "
Potash	..	1.26	" "
Nitrogen	..	0.81	" "

The Department of Agriculture became interested in the results obtained and was soon convinced that compost was an ideal organic manure for the cultivation of sugar-cane. The completion of the Krishnarajasagara Dam and the Irwin Canal had just brought 125,000 acres of land under irrigation within 30 miles of Mysore city. Since sugar-cane cultivation was being encouraged in this area, the municipal council saw the prospects of an unlimited demand for their product and decided upon composting as the most economical method of disposal of their two most important nuisance problems, *viz.* night-soil and street-rubbish disposal.

Method of composting

At Mysore city, about 1,800 gallons (18,000 lbs.) of night-soil are collected each day. Taking the average daily amount of human excreta as 5 ounces, this represents a collection from 45,000 people, that is about 50 per cent of the total city population. Most of the remainder of the excreta is collected from the streets and open spaces in the city and dumped into the refuse bins. This mixture is what makes the street refuse of Indian cities so valuable as manure.

The street rubbish is brought to the sewage farm by carts and lorries and dumped alongside a line marking the site of a new pile. This rubbish is then forked into place to form a pile 6 feet wide at the base, 4 feet at the top, 2 feet high and about 500 feet long. Large stones, glass, and bits of earthenware pots are removed by hand at this stage. The night-soil collected by the municipal staff each day is brought to the sewage farm in night-soil carts drawn by one bullock and in charge of one driver. These carts are so constructed that they can be tilted at the rear and the contents dumped. The night-soil as received is a fairly dry mixture of night-soil, leaf linings of night-soil baskets, ashes, and dirt, filling about one-third of the cart. To this mass sufficient water is added to make a mixture of one part of night-soil and two parts of water. The contents of the cart are then stirred and applied to the piles.

The piles of rubbish to be treated each day are first trenched by four coolies before the arrival of the night-soil carts. The trenching consists of pulling the centre of the pile toward the edges so as to form a V-shaped trench about a foot deep in the centre of the pile. The contents of the night-soil carts are then dumped into these trenches. Each cart is tilted four

times at intervals of about 12 feet and the emulsion spread uniformly in the trench. As soon as one rubbish pile is treated, the sides of the pile are pulled back to the centre completely covering the deposit of night-soil emulsion. A



Fig. 1.—A view of the composted field.



Fig. 2.—Applying emulsion to trench in rubbish heap.



Fig. 3.—Close-up view of emulsion in trench showing the presence of leaves brought in with the night-soil.

sufficient number of rubbish piles are formed so that each pile receives night-soil treatment every seventh day. The piles undergoing decomposition are turned each week by forking the contents of the pile into an entirely new position. During dry weather it is necessary to water the piles in order to bring the moisture content to a damp state without being wet. This is done by applying water to the tops of

the piles from an ordinary sprinkling cart two days before the application of the night-soil.

The method described above resembles the ordinary trenching of night-soil except that it is done under aerobic conditions. Fermentation is set up with the development of moulds and bacteria and high temperatures are produced in the pile. The raw rubbish gradually attains a brownish colour and after six to eight weeks is completely broken down into a smooth brown humus containing particles of the more resistant bits of rubbish which withstand the fermentation process. The finished product is screened through expanded metal screens of one-half inch mesh. The fine material is stored in heaps for sale and the coarse screenings, with the stones, bits of earthenware, etc., removed, are added to rubbish heaps undergoing decomposition. Dr. Fowler recommends that only half the finished heap be removed for storage and that the remaining portion be mixed with fresh rubbish, in which it acts as an activator and hastens the process. This recommendation is now being carried out at Mysore city and a considerable saving in the time required for the process is noticed. The mixing of the raw and digested material is similar to the 'seeding' process in common use in sewage-disposal plants and Beccari cells.

moisture content of less than 65 per cent. If the pile is allowed to become sodden, the temperature is reduced and the growth of the moulds is impeded.

Experiments

It was necessary to carry out certain experiments in order to lay down specific instructions which could be followed by those interested in the process. The author enlisted the aid of Dr. Leslie C. Coleman, M.A., Ph.D., C.I.E., Director of Agriculture in Mysore State, and of Dr. Gilbert J. Fowler, D.Sc., F.R.C., Representative in India and the Far East of Activated Sludge Ltd., Bangalore, South India, in defining certain experiments necessary for the establishment of the process. It was finally agreed that the success of composting depended upon the solution of the following problems:—

1. The proper interval of application of night-soil emulsion
2. The strength of night-soil emulsion to be used
3. The rate of application of night-soil emulsion
4. The period of turning

With these requirements in view, experiments* were outlined to be carried out at the Mysore



Fig 4.—Storage heaps of finished compost. Experimental piles in left foreground.

It may be said that the process becomes odourless shortly after the night-soil emulsion in the trenches is covered with rubbish. The temperature in the piles begins to rise on the second or third day after the application of the night-soil mixture. Within a week temperatures of 48° to 50°C. have been recorded (air temperature 27° to 28°C.). It was impossible however to maintain uniformly high temperatures throughout the pile because of the heterogeneous nature of the night-soil emulsion and the difficulty of getting this thoroughly mixed with the street rubbish. Moulds begin to form after the first week and continue to spread throughout the pile wherever the temperature and moisture conditions are favourable. Their growth is more rapid in those sections of the pile that have a

sewage farm under the supervision of an agricultural inspector.

Fly breeding

Some fly breeding was experienced in the compost work as carried out on a large scale at Mysore city. The presence of leaves and other foreign matter in the night-soil made it impossible to prepare a uniform night-soil emulsion for application to the piles with further treatment. It was therefore difficult to maintain the uniformly high temperatures inimicable to fly

* In the interest of economy of space we have been compelled to omit details of these and the fly-breeding experiments referred to below. The practical outcome of the experiments were, however, the formulation of 'Instructions for composting' which are given below in full.

breeding. It was found that the number of flies present was due to the following three causes:—

- (a) Adult flies harbouring on the night-soil and rubbish carts returning from the city
- (b) Fly larvæ and maggots included in the night-soil and rubbish collected from the city
- (c) Fly breeding in the compost heaps

The first source is not of importance, since it is a means of diminishing the number of flies in the city. The last two sources, however, had to be controlled, if this method of composting was to become popularized. It was noticed that fly larvæ and maggots in the compost piles were most numerous between the leaves brought in with the night-soil where accumulations of raw night-soil resulted in a decrease in temperature. Fly larvæ in different stages of development were found in compost piles recently treated with night-soil. The piles treated with night-soil prior to the fourth day before the investigations and showing decomposition of the night-soil contained only a few large larvæ.

During the experimental work in composting, there was no fly breeding in the piles. The emulsion used was a properly-mixed uniform emulsion of night-soil and water with all extraneous matter, such as leaves, removed. This was in accordance with the experiences of Fowler and Howard and Wad, who reported an absence of fly breeding during composting. The secret of fly breeding in the piles depends upon the condition of the emulsion when applied. This was demonstrated by the treatment of experimental piles on a fly-trap platform.

In this experiment the number of larvæ rose from 72 on the second day to 3,849 on the third day and to 7,648 on the fourth day. The peaks in this curve rose abruptly about the time that the night-soil solution was added and except for the fourth week the peaks are gradually reduced until the seventh week, when a maximum of 29 larvæ were collected on any one day.

It must be borne in mind that with each application of the night-soil emulsion countless numbers of fly larvæ were introduced into the pile. Most of these were killed off by the high temperatures maintained. As the process approached the completed stage, the condition of the refuse was more homogeneous and higher temperatures were more easily maintained.

Fly larvæ introduced into the experimental piles with the night-soil emulsion were destroyed by the uniformly high temperatures maintained; no larvæ were noticed either on the platform or in the surrounding trenches.

Instructions for composting

The experiments carried out and the experience gained with the original experimental heaps show that street refuse can be composted into a valuable organic manure without fly breeding when a properly emulsified night-soil solution is prepared. The results of the experiments for the establishment of a process for composting

indicate that the following procedure should be followed:

1. Place the rubbish in piles 6 feet wide at the base, 2 feet high and 4 feet wide at the top. Separate all glass, tins, earthenware pots, stones, etc.
2. Trench the pile down the centre for the application of the night-soil emulsion.
3. Prepare a uniform emulsion of one part night-soil to four parts liquid, carefully excluding all leaves and other extraneous matter.
4. Apply the emulsion to the trenched rubbish piles at the rate of two gallons per running foot. Close the trench in the pile.
5. Apply the emulsion to the rubbish piles daily for a period of about two weeks or until the pile becomes fairly moist. Then make applications to the pile every third day. The interval of application will depend upon the weather conditions. When rains are fairly heavy, the strength of the emulsion may be increased and the rate of application decreased. If the rains are continuous and heavy enough to soak the piles thoroughly, some shelter must be provided in order to maintain the high temperatures necessary for composting.
6. When the rubbish has broken down into a brown humus mass one-half of the pile may be removed and stored for screening; the remaining portion of the pile may then be mixed with raw rubbish and the process repeated as from the beginning.

In communities where the night-soil is collected free of extraneous matter, composting may safely be carried out by the above method without fly breeding. In order to ensure a uniform emulsion, the night-soil may be mixed with the proper proportion of water and allowed to liquefy before application to the piles. This liquefaction will reduce the solid lumps of night-soil which would require additional time to break down in the rubbish pile. In Mysore city, the process is being improved by the construction of a macerating tank (see figure 5) in which the leaves are removed from the night-soil in preparing the emulsion and the solid lumps are allowed to liquefy. The contents of the night-soil carts are dumped into the smaller portion of the tank into which the proper amount of water is added and the mass is thoroughly agitated with forks and compressed air until the leaves are removable. These leaves are removed from the tank and mixed with fresh rubbish heaps. The emulsion passes over a weir protected with an expanded metal screen into the larger chamber from which it is drawn off for application to the piles. At present, the night-soil carts, after dumping, are

refilled with the emulsion for application to the piles. There is a proposal to lay pipe lines to convey the emulsion to the rubbish heaps so that the applications may be made by means of

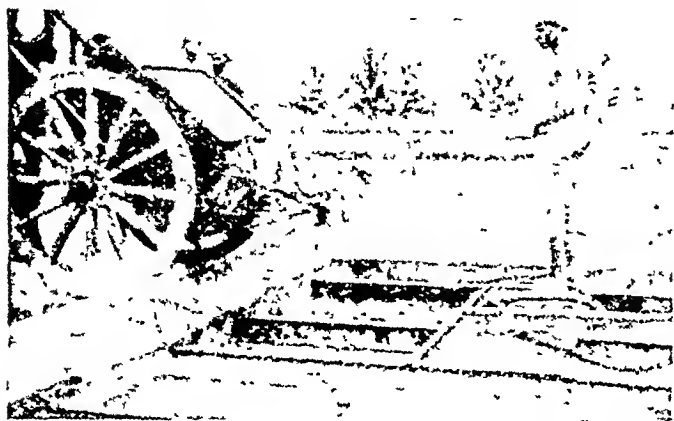


Fig. 5.—View of night-soil cart showing the condition of night-soil as received at macerating tank.

a rubber hose. This would be less offensive and would ensure a more uniform application.

The author has composted all house refuse and garbage excepting tins and glassware, including leaves and weeds collected from his garden, for a period of two years. A small septic tank was constructed for the treatment of night-soil conserved from the bungalow. The effluent from the septic tank, *plus* daily withdrawals of sludge from the bottom of the tank, were mixed in equal proportions and applied to the refuse heap at the rate of two gallons per cubic foot. This process was carried out successfully without fly breeding and was free from odour. The amount of compost produced was sufficient for the fertilization of the flower beds in the compound.

COST OF COMPOSTING

In a discussion of costs, it is difficult to separate those items which should definitely be charged against the collection and those which should be charged against the compost making. For example, the drivers of the night-soil and rubbish carts are responsible for the ultimate disposal of their cart loads. They therefore receive no extra remuneration for dumping the rubbish or for preparing and applying the night-soil emulsion to the rubbish heaps.

Before going into the cost of composting, it would be advisable to determine the unit costs of collection and disposal of night-soil and rubbish.

The cost of night-soil collection is as follows:—

	Rs.
16 sanitary inspectors at Rs. 70 plus 10 per mensem ..	15,360
55 conservancy peons at Rs. 12 per mensem ..	7,920
110 scavengers at Rs. 11 per mensem ..	14,520
55 night-soil carts, operation and maintenance at Rs. 22-8 per mensem ..	14,850
TOTAL Rs. ..	52,650

As the above cost represents the collection from about 45,000 people, the annual cost of night-soil collections is about Re. 1-3-0 *per capita*.

If this night-soil were to be trenched, the cost of such trenching is estimated as follows:—

1 sanitary overseer at Rs. 50 per mensem	Rs. 600
10 coolies at Rs. 12 per mensem ..	1,440
TOTAL Rs. ..	2,040

The cost of rubbish collection is as follows:—

5 sanitary inspectors at Rs. 80 per mensem ..	Rs. 4,800
15 sanitary overseers at Rs. 50 per mensem ..	9,000
49 peons at Rs. 12 per mensem ..	7,056
440 sweepers at Rs. 11 per mensem ..	58,080
50 rubbish carts, operation and maintenance at Rs. 22-8 per mensem ..	13,500
2 lorries—operation and maintenance ..	6,800
Repairs to dust bins ..	1,400
TOTAL Rs. ..	1,00,636

The average annual collection of street rubbish amounts to about 20,000 tons or about Rs. 5 per ton.

The staff employed in the dumping of street rubbish is as follows:—

1 sanitary overseer at Rs. 50 ..	Rs. 600
12 coolies at Rs. 12 ..	1,728
TOTAL Rs. ..	2,328

The labour and supervision charges which might be said to represent the costs incurred in the making of compost are as follows:—

	Total per annum
1 supervisor at Rs. 80 per mensem ..	Rs. 960
1 maistry at Rs. 12 per mensem ..	144
Coolies for	
Preparing heaps 4	} 20 coolies at Rs. 10 per mensem .. 2,400
Trenching .. 2	
Assisting night-soil cart drivers 2	
Turning .. 4	
Watering .. 2	
Screening .. 4	
Clearing .. 2	
20	

Contingencies	146
TOTAL Rs. ..	3,650

On the basis of 4,000 tons per year, the cost of composting amounts to less than Re. 1 (\$0.30 gold) per ton.

Summary

Ordinary street refuse, consisting of paper, rags, cardboard, straw, leaves, weeds, etc., can be composted into a valuable organic manure by treatment with night-soil emulsion.

The process may be carried out without fly breeding, provided a uniform emulsion of night-soil and water, free of leaves and solids, is used.

One thousand gallons of night-soil per day, properly emulsified in the proportion of one part night-soil to four parts water, will produce 4,000 tons of compost per year from about 45,000 tons of street rubbish.

(Continued at foot of opposite page)

THE SANITARY DISPOSAL AND AGRICULTURAL UTILIZATION OF HABITATION WASTES BY THE INDORE PROCESS

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and

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Sanitation—the present position

THE sanitary disposal of refuse and human waste, so essential to the welfare of humanity throughout the world, is still far from being universal, or even widely practised. This is partly due to the apathy of the general public who have a natural aversion to such a subject, and in many countries it is dealt with in a casual way even by public authorities who are also often handicapped financially. These facts restrict the use of methods of disposal involving skilled attention and costly operation or outlay*. Even where such methods are used their practical efficiency is sometimes far from that desirable and attainable.

Even the more progressive parts of the world still use comparatively cheap and simple methods while in India and similar countries the problem is further complicated by the habits and extreme poverty of the people. At the

*For instance, in the activated-sludge system, the most up-to-date method, with 15 gallons sewage per head, the capital cost is Rs. 500 per 1,000 population, and the annual operation cost annas 14 per head (Williams, 1924).

(Continued from previous page)

The cost of composting amounts to less than Re. 1 per ton and in Mysore city yields a profit of over 275 per cent on the annual operation charges.

The cost of composting and the area required can be reduced considerably by the installation of a piped system for the application of the night-soil emulsion.

Street refuse and kitchen wastes may be composted by treatments with sewage sludge in place of night-soil emulsion.

This work has been the result of the co-operative efforts and valuable suggestions of Dr. Gilbert J. Fowler, D.Sc., F.I.C., Representative in India and the Far East of Activated Sludge Ltd., Bangalore, Dr. Leslie C. Coleman, M.A., Ph.D., C.I.E., Director of Agriculture in Mysore State, and Mr. T. G. Rama Iyer, B.A., President, Municipal Council, Mysore City.

REFERENCES

- Fowler, G. J. (1930). Recent Experiments on the Preparations of Organic Manure. *Agric. Journ. India*, Vol. XXV, No. 5.
- Howard, A., and Wad, Y. D. (1931). *The Waste Products of Agriculture*. Oxford University Press, London.
- Hyde, C. G. (1932). *Western Construction News and Highways Builder*, 10th October.
- King, F. H. (1911). *Farmers of Forty Centuries*. London.
- Soper, G. A. (1931). *Municipal Sanitation*, May.

present time in India both night-soil and refuse are disposed of in the following ways:—

(1) In rural areas they are promiscuously scattered near habitations and along pathways and watercourses, thus endangering health.

(2) In urban areas the refuse is either tipped on outlying land and left to rot, or is used to fill up depressions; a portion is sometimes sold as fuel to potters. In a few places it is dumped into large rivers or the sea. The night-soil is collected and carted, in an advanced septic condition, either direct to cultivated land, or to trenches of various sizes and depths where it is covered with earth, or with earth mixed with ashes and refuse. Sometimes, after a year or more, crops are grown on the site of the trenches, or with the rotted manure taken from them. In practice the trenching method produces noxious odours, often allows flies to breed, and can hardly be called a sanitary means of disposal.

(3) Even in the few cities served by a water-borne sewage system, the sludge is always difficult to handle, and other refuse has still to be dealt with usually by incineration (Williams, 1924), (Leather, 1895), (Kelkar, 1909).

In Western countries also, collection and carting of night-soil is still generally practised in the smaller communities and in outlying parts of cities. The refuse is handled in much the same way as in India, though sometimes a little sorting is done to obtain by-products, or differential treatment given to special kinds of waste, but this only applies to well-organized cities (Hering and Greely, 1921).

The agricultural aspect

From the agricultural point of view the position is still less satisfactory. As early as 1893 Dr. Voelcker regarded 'the spread of a good system of utilizing human and household refuse, street sweepings, etc., on the land as a most potent factor in the improvement of Indian agriculture'. Dr. Leather again emphasized the point in 1895, thus:

'There is, perhaps, no more important subject in relation to agriculture than the proper disposal of night-soil and other town refuse, for it may be said, without exaggeration, that nearly one-half the plant food extracted by food-crops from soil is contained in the materials which are included under these two heads. It follows, therefore, that on their proper disposal and return to the soil, depends the addition of a large proportion of the food necessary for the crops'.

This pronouncement is beyond denial. The enormous potential manurial value of habitation wastes—very little exploited in any part of the world for want of suitable means—is displayed in the following figures (table I).

The high crop-production value of human waste is known and for centuries advantage has been taken of it by the Chinese (King, 1926); yet in other tracts, including India, it has never been sufficiently made use of owing to prejudice rather than to ignorance (Kelkar, 1909). Applied in any form high yields of a great variety of crops are obtained.

TABLE I*

	PERCENTAGE COMPOSITION			AMOUNT OF WASTE AND MANURIAL CONSTITUENTS, IN IT PER CAPITA ANNUALLY, IN POUNDS			
	Town refuse	Human faeces	Human urine	Town refuse	Human faeces	Human urine	Total
Organic matter ..	22.62	21.72	4.85	122.7	23.2	46.9	192.8
Nitrogen ..	0.7	1.57	1.00	3.80	1.68	9.67	15.15
Potash K ₂ O ..	0.27	0.55	0.18	1.46	0.59	1.72	3.77
Phosphorus P ₂ O ₅ ..	0.43	1.23	0.15	2.33	1.32	1.45	5.10
Amount of waste ..	..	..	..	543.00	107.0	967.0	..

* Table I is compiled with the aid of data given by Brittain, Hering and Greely.

Compared with artificial manures organic manures appear to be of specific importance in other directions, namely, their influence on the reproductive capacity of the seed produced and on its feeding value to animals and man. Vishwanath and Surya Narayana (1927) found that seed from a crop of *ragi* (*Eleusine coracana*), which had been grown with farmyard manure, gave higher yields than crops sown with seed raised with artificial manures or without manure. McCarrison (1926) has shown that grain produced on farmyard manure contains more vitamins than that grown with mineral manures. Ramiah (1933) reports that forage crops (*ragi* straw) grown on farmyard manure are similarly rich in vitamins.

In the light of the foregoing summary few sanitarians and no agriculturists would quarrel with the statement that the ideal disposal of habitation wastes is to send them back to the land as organic manure. It may be argued that this has been done already in the majority of disposal systems, but it has generally meant enormous waste of organic matter and of nitrogen because of the long-continued anaerobic fermentation that occurs after burying and also in water-borne sewage. Further, the area of land to which the wastes are actually returned by these systems is a minute proportion of the area which feeds the population producing the wastes, and that minute proportion is excessively dosed. In addition the return of wastes to the land under these systems seldom even meets the cost of disposal.

Sanitation methods conserving manure

It is true that for centuries the Chinese have been returning their habitation wastes to the land in agriculturally suitable doses but they have paid little regard to sanitation. On the other hand all the modern biological systems of disposal, from the septic tank to the aerobic filters, deal mainly with the sanitary aspects, the agricultural side being treated as of minor importance. Methods of the type of the activated-sludge system of Dr. Fowler are perhaps the first attempt to aim at full conservation of plant food in addition to satisfactory sanitation. These developments apply only to night-soil. Other refuse is still allowed to rot as it may,

or its organic matter is completely lost by burning. Kelkar (1909) mentions, among other current methods* for disposal, the drying of night-soil with ash by frequent stirring; also trenching in a pit in alternate layers of refuse and night-soil covered with earth. An apparently similar method has now been announced by Viswanadha Ayyar but chemicals are used to deodorize. Details of technique, costs and quantities are not given. The idea of treating both night-soil and refuse together, with the intention of securing optimum aerobic biological activity, is of recent date.

During the attempts to solve the difficulties of utilizing activated sludge, Fowler (1903) made compost with agricultural wastes, using sludge as a starter. He also suggested the use of night-soil for composting refuse on the basis of the fundamental principle [discovered by Russell and Richards (1917) and further developed by Hutchinson and Richards (1921)] of converting straw to humus with nitrogen by means of aerobic fermentation. Fowler's experiments have recently resulted in a formulated process described by Anstead (1932). The factors involved in the decomposition have been studied further by Rao and Subrahmanyam (1932). Howard and Wad (1931) indicated the possible adaptation of the Indore method of composting farm wastes to the utilization of habitation wastes.

Essentials for disposal of habitation wastes

The essentials of any system likely to be adopted universally appear to be:—

- (1) Immediate treatment of all habitation wastes as they arrive at the disposal ground
- (2) No proportioning of refuse to night-soil or other pre-treatments, such as liquefaction
- (3) No fly breeding or noxious odours
- (4) A simple routine technique with as few operations as possible
- (5) No need of skilled supervision. The sweeper class ought to be able to manage the working by themselves.
- (6) A simple installation with small capital outlay and low operation costs

The ideal set by these essentials does not seem to have been attained by any process in vogue.

Conservation of nitrogen

It must be emphasized that complete conservation of all nitrogen supplied by human waste is only possible if sufficient quantities of refuse are available carrying enough non-nitrogenous organic material to balance the total amount of nitrogen. In actual practice this seldom or never happens. The average organic matter in mixed refuse, faeces and urine, per head of population per year is about 192.8 lbs.,* while the nitrogen contained in it amounts to about 15.5 lbs., giving a ratio of 12.7 to 1. One hundred and forty-three parts of organic matter of the nature of straw will utilize, for complete decomposition, only 1 part of nitrogen, any excess being lost. Thus habitation wastes contain far more nitrogen than can be conserved in practice. Any attempt at greater conservation (without sufficient non-nitrogenous organic refuse) necessarily involves an unstable putrescible product, hence such disposal is not sanitary. Actually, even a lower proportion of nitrogen seems to be effective, because, in a properly conducted decomposition, fixation accurately adjusts any deficiency.

The maintenance of high nitrogen content in soils need not be allowed to become a fetish if sufficient humus is supplied. There is always a limit to the amount of nitrogen that soils can hold, depending on the type and the climate (Jenny, 1928). Perhaps 'it is more economic to maintain a low nitrogen level in the soil and to keep the nitrogen active by maintaining a narrow N : C ratio rather than to try to build up a high nitrogen content' (Lyon, 1929).

Hence it is more reasonable to direct special attention to quick and sanitary disposal of whatever proportions of refuse and night-soil are available rather than to lay stress on full nitrogen conservation. Natural fixation of nitrogen in soil from the air is generally not sufficiently taken into account when assessing nitrogen removed by crops. It is the balance between addition by fixation and the removal by crops that matters. Phosphorus and other components of habitation wastes can, however, be wholly recovered.

The Indore process

(a) *Development.*—While the Indore process for composting agricultural wastes was undergoing adaptation to a few special local conditions the Member in Charge, Medical Department, Holkar State [Lieut.-Col. J. R. J. Tyrrell, C.I.E., I.M.S. (retd.)], invited the Institute of Plant Industry to extend these adaptations to the treatment of habitation wastes and offered facilities for trials at the disposal grounds of the Indore Municipality. These trials, which had been contemplated by Howard and Wad (1931), began in March 1932 and were duplicated almost simultaneously in the Residency area at the suggestion of the then Chief Medical

Officer in Central India. The trials were entirely successful from the first and a simple technique was rapidly developed. Within a few weeks, at the Residency area disposal ground, all incoming wastes were being composted by the new method and it was soon decided to follow suit at the municipality's main disposal ground (serving a population of 60,000) as soon as the necessary trenches and roads could be made. This has since been done and the new process is in full operation. Neemuch (C. I.) cantonment and the Malwa Bhil Corps at Indore also have abandoned their old systems in favour of the Indore process.

(b) *The main features of the Indore process are—*

(1) The immediate treatment of both the refuse and night-soil, one after the other, as soon as they arrive at the disposal grounds, the carts being backed to the edge of a trench 2 feet deep and 15 feet broad.

(2) The addition of half-rotted compost in small amounts as a starter.

(3) Lightly spreading by suitable long handled rakes in thin layers so that they become mixed (figure 2).

(4) A rapid rise of temperature (usually to above 50°C. and never below 45°C.) which persists up to the third turn and kills pathogenes and fly larvæ.

(5) The restoration of air three times by turning with a digging fork (figures 3, 4 and 5) to ensure steady and intense microbial activity and to kill (by burying in the hot mass) any maggots that may hatch out at the exposed cool edges of the heaps. The periods between turning are short enough to prevent any such larvæ developing into flies and to reduce the chances of their crawling out in wet weather to shelter and pupate in the bottom and sides of the trench.

(6) The replenishment of lost moisture by adding water, if needed, at the times of turning.

(c) *The advantages* have been found to be :—

(1) Low capital outlay and operating costs.

(2) A net profit from the sale of manure.

(3) Simple construction of permanent trenches not requiring professional engineering knowledge.

(4) Economy in disposal ground area.

(5) The prevention of offensive odours and fly breeding.

(6) The process can be worked in the open without cover in all seasons, even during continuously wet seasons with 47 and 52 inches of rain and heavy falls of nearly six inches in 24 hours.

(7) No need of skilled supervision.

(8) Exceptional cleanliness at the disposal grounds.

(9) The short period required for complete decomposition to a rich manure in large quan-

* See table I.

tities which is safer for crops than ordinary poudrette.

(10) The surplus income becomes available for other sanitary measures for improving public health.

(11) It is equally applicable to large or small communities as shown in table V.

The working of the process is described in detail in the appendix. For nearly two years it has always given satisfactory results, it appears to meet all the essentials of a sanitary disposal system and it is also commercially profitable.

(d) *The course of decomposition* involved in the process is now to be described. On arrival both the night-soil and some components of the refuse are already in a more or less advanced septic condition. Night-soil tends to liquefy as soon as it is allowed to accumulate, with the production of foul, volatile products which have to be destroyed immediately they are produced. The physical nature of fresh night-soil is such that if an attempt is made to mix it intimately with refuse, it fills the interspaces and forms a dense, viscous, anaerobic mass, thus preventing oxidation of the noxious products which continue to be formed at an intensified rate. The wheel turns the other way when, as in this process, the night-soil is only lightly and rapidly spread along with the refuse in fairly thin layers. It then forms a coating on the refuse with wide interspaces for aeration. The partial dessication that follows clots the colloids and slows down their decomposition. The formation of obnoxious anaerobic substances is checked so that the copious aeration is able to oxidize them completely. This is why nuisance is effectively suppressed.

If, however, the trenches are carelessly charged, septic conditions will persist and be intensified. If this happens it will be corrected when aeration is restored at the first turn, four or five days after charging. The danger of nuisance persists until the putrescible nature of the material has vanished and it is no longer a suitable habitat for harmful organisms, even when infected by them. Thereafter there is no danger left. In order to reach this stage quickly the heaps are further mixed, aerated and moistened at suitable intervals to quicken fermentation and keep up the heat until an innocuous product is obtained. Incidentally any maggots in the cooler fringes are turned into the hot mass and killed.

Inoculation of the mass with half-rotted compost while charging is included in the process but the efficacy of this step depends entirely upon aeration, without which no inoculum, however active, will accelerate the initial speed of decomposition. Even with aeration, so little difference has been observed to follow inoculation that its efficacy may possibly be best described as a selective accumulation of a virile biological population. In fact decomposition is

perfectly satisfactory without inoculation, as necessarily happens when starting the process in a new place. It is hence essential to avoid too much liquid in the heap, especially in the beginning. If sullage water in large quantities has to be disposed of simultaneously with night-soil and refuse, this point becomes very important. Such sullage water might perhaps be better disposed of by adding at the second turn. Rain does not offer any difficulty, as with properly made heaps it does not penetrate very deeply and the drainage space left in the trench prevents accumulation.

Rapid crumbling of fibrous material occurs and under favourable conditions may be completed in three weeks, though, as a rule, a slightly longer period is needed, according to the season.

(e) *The economics*.—By adopting this system the financial loss that hitherto occurred in disposal ground management has now been converted into a profit, even when the manure is sold at as low a price as eight annas a cart-load.

TABLE II

ANNUAL EXPENSES AND RECEIPTS OF INDORE CITY DISPOSAL FUND UNDER THE OLD AND NEW SYSTEMS

	Old	New
Expenses ..	Rs. 6,064	Rs. 3,120
Receipts ..	" 1,528	" 6,205
Deficit ..	" 4,535	" ..
Profit ..	..	Rs. 3,085

Thus, at the Indore Municipality's disposal ground, under the old system only 25 per cent of the working expenses were met by receipts. Under the new process the receipts are twice the cost of working.

(f) *Intake, output and time*.—The yield of compost is shown in table III.

TABLE III

YIELD OF COMPOST AT INDORE CITY DISPOSAL GROUND

	Cubic feet	Tons
Town refuse ..	52,465	602
Compost ..	30,835	909 *
Refuse per 100 cubic feet compost.	170	..
Refuse per ton of compost.	..	0.66

* Note.—Including moisture, 40 per cent, and solids from night-soil.

Experience has shown that whatever may be the scale of operation the process never requires more than three weeks to reach the third turn. Owing partly to the rapid fermentation the water requirement is low (still lower than for agricultural compost by the Indore process) and even in the hot weather the necessary supply is not a costly item. The production of manure is high—nearly half the original volume of refuse. The average weight of refuse at Indore

was found to be 25.7 pounds per cubic foot and that of ripe manure (moisture 40.9 per cent) 66 pounds per cubic foot. The Indore refuse contained all the usual components, e.g., in an examination of seven tons of refuse from carts taken at random, household wastes, paper, market wastes, fodder residues, animal excreta, potsherds and scrap metal were found.

The cost of making the compost at the Indore city disposal ground has been 3.9 annas per ton (average from daily records taken for over a year). Costs of collection and carting are, of course, excluded, being common to all disposal processes.

(g) *Labour requirements.*—The labour required is unskilled and the cost is low.

by Kelkar to persist in the soil for 10 years. The composition of the ripe compost from various sources has been estimated at intervals; this nitrogen and phosphate compost compares favourably with manures from other sources but is lower than those of poudrette after 6 months' trenching. The details are available, but have been omitted in the interest of space.

Nitrogen content varies considerably. There is a remarkably high lime content. A low phosphate content was noted in the Malwa Bhil Corps product; this is perhaps due to the simple diet of the sepoy.

The manure has so far been used at the institute and by cultivators for cotton, jowar (sorghum), wheat, sugar-cane, potatoes, Indian and

TABLE IV
Labour employed

Disposal ground	AVERAGE DAILY INTAKE		Number of men	Total daily wages
	Refuse, cubic feet	Night-soil, gallons		
Indore City	2,025	1,313	22 and 1 foreman	Rs. 8-9-7
Indore Residency Area	366	420	3	Re. 1-2-0
Malwa Bhil Corps	90	120	2 *	" 0-12-0
Neemuch Cantonment	700	1,040	7	Rs. 2-4-0

* These men do the sweeping and collection of refuse and night-soil in addition.

(h) *Initial costs.*—The economy of space and the low installation costs are evident from the following table :—

European vegetables and extensively in private gardens for flowers. The results were everywhere satisfactory.

TABLE V
Installation costs and space economy

Disposal ground	Total trench length, feet	Daily intake refuse, cubic feet	Population served	Cost of installation, Rs.	SPACE REQUIRED	
					Old process, acres	New process, square feet
Indore City	1,200	2,025	60,000	4,600 †	25	134,200
Indore Residency Area	240	366	4,400	222	1.3	12,000
Malwa Bhil Corps	100	90	1,000	*	1	3,000
Neemuch Cantonment	280	700	800	200	*	14,000

* Not available.

† Including Rs. 2,000 for roads and Rs. 1,000 for revetments and partitions.

(j) *Manurial value of the compost.*—The residual value of poudrette has been mentioned

In quantitative experiments on lucerne and wheat the yields were :—

TABLE VI
Response of lucerne and wheat to composts
A. Yields in pounds per acre of lucerne (3 cuttings)

	Farm compost (47.3 per cent moisture)			Habitation-waste compost (33.7 per cent moisture)		
	10	20	30	10	20	30
Cart-loads per acre	17,600	25,680	25,200	28,080	32,400	38,080
Yields in lbs.						
Quantity of nutrients added per acre in lbs.—						
Nitrogen	50.8	101.5	152.3	49.8	99.7	149.5
Phosphate (P ₂ O ₅)	48.1	96.2	144.2	95.1	190.3	285.4
Ratio N. : P ₂ O ₅		1 : 0.95			1 : 1.91	

TABLE VI—*concl'd.*

B. Yields of wheat—grain and straw—in pounds per acre.

	FARM COMPOST			HABITATION-WASTE COMPOST			AMMONIUM SULPHATE		
	1 unit N.	2 units N.	3 units N.	1 unit N.	2 units N.	3 units N.	1 unit N.	2 units N.	3 units N.
Grain	1,325	1,463	1,829	1,310	1,757	1,886	1,037	1,080	1,210
Straw	1,526	1,708	2,117	1,430	2,147	2,162	1,244	1,352	1,472
Quantities added per acre in lbs.—									
Nitrogen	36.7	73.4	110.2	36.7	73.4	110.2	36.7	73.4	110.2
Phosphate (P ₂ O ₅)	33.8	67.6	101.3	67.2	134.4	201.6	..	..	..
Ratio N. : P ₂ O ₅		1 : 0.92			1 : 1.83				

The phosphorus content of habitation-waste compost is in this instance almost twice that of farm compost made from plant residues and this obviously accounts for the superior yield of lucerne treated with the former. With field crops at Indore such as wheat no appreciable difference has appeared, and the nitrogen-phosphate ratio in both seems to be adequate. The suitability of habitation-waste compost even for ordinary crops is clear. The low yields with ammonium sulphate may be due to want of phosphate, or more probably to more rapid exhaustion of available nitrogen.

There seems every reason to suppose that the process will be suitable for a wide range of climates and agricultural conditions. In western countries it is probable that it will suit the needs of small communities, while the cities with sewage systems can utilize their sludge to convert the refuse to manure. No doubt labour-saving devices and mechanical aids will have to be evolved where large quantities are to be handled, and the cost of labour is high.

The writers believe it can be claimed, without exaggeration, that the Indore process for the disposal of habitation wastes is much simpler and more economical than any other process so far attempted. It supplies a ready and practical means of preventing that prodigious waste of fertilizing substances which has hitherto increasingly characterized all stages of human civilization, while, at the same time, it constitutes a real advance in sanitation, providing a cheap and profitable solution of the refuse-disposal problem which is still imperfectly solved in most communities in the world. Sanitation need no longer be a luxury confined to large and prosperous towns.

Acknowledgments.

Without the co-operation and willing assistance of Lieut.-Col. J. R. J. Tyrrell, C.I.E., I.M.S. (ret'd.), Director of Public Health and Sanitation, Indore State, and of Lieut.-Col. R. F. D. Megregor, I.M.S., and his successor Lieut.-Col. M. E. Nicholson, I.M.S., Chief Medical Officer in Central India, the process described could not have been developed for lack of facilities.

To Mr. A. W. H. Dean, Executive Engineer, C. I. Agency, Mr. Prabha Dayal, Superintendent, Civil Area, and to Rai Sahib Dr. Ram Sahai, Sub-Assistant Surgeon in the C. I. Agency, the writers' thanks are due for the readiness with which their suggestions have been adopted and for the care with which records have been kept and in equal degree they are grateful to Dr. Bhargave, Executive Health Officer, and his staff on the Indore Municipality.

Capt. R. M. Lindsley, Commandant of the Malwa Bhil Corps, and Dr. Blunt, Sub-Assistant Surgeon, have shown how well suited is the process to the needs of rather small detachments of troops while Capt. W. B. MacEvoy, I.M.S., at Neemuch, C. I., is demonstrating its adaptability to cantonment conditions. Their careful recording of data has been of much value.

Summary

(1) The present efficiency of disposal and utilization of habitation wastes, affecting a considerable portion of humanity, is discussed.

(2) Its importance to agriculture has been emphasized.

(3) Recent attempts to solve the problem have been reviewed.

(4) The essentials of an improved system for general adoption are given, the futility of attempts at full nitrogen conservation in practice being emphasized.

(5) The main features, advantages and the mode of operation of the Indore process are indicated.

(6) Quantitative relations of wastes and compost, its cost and agricultural value, and the scope for the application of the process have been shown.

APPENDIX

DETAILED TECHNIQUE

Installation.—The essential part is the charging trench, which should be fifteen feet wide, and two feet deep. The floor must slope gently along its length to prevent water-logging, and must discharge into a natural drainage channel. It must be served by a road to be used as a charging platform running alongside. This

road may lie between two trenches, serving each, and usually the most economical construction is to dig the trenches one foot deep and pile enough of the excavated earth to make the road foundation. The road should be at least fifteen feet wide (preferably twenty feet) and suitably metalled to stand carting in wet weather. The side of the trench against the road must be vertical and should be reveted with timber or a wall of stone or brick, the top of which should carry a sill of suitable material (e.g., old steel rails, girders, or heavy logs) against which carts can back. Without this sill a log must be put in position at each tipping.

The other side of the trench is to be bounded, preferably by a partition, the top half of which is removable—old sleepers, boards, logs, or thick corrugated iron sheet between upright posts—or by an earth, stone or brick wall, rising two feet above the trench floor. Beyond this partition about twenty feet space must be left for storage; in practice extensive sales of compost are usually confined to two or three periods of the year. This storage ground may be excavated level with the bottom of the trench if desired. Unless dug on solid stony ground the trench must always be floored with road metal or at least well-rammed brick-bats and rubble; the storage ground is also better so treated. It is wise to build an earth bank with a drain on those sides of the whole installation from which the flow of surface water is to be feared.

The total length of charging trench required is determined by the average daily quantity of refuse received. Experience has shown that for each cart-load* of refuse received daily, 1 foot 4 inches length of trench is necessary. The volume of night-soil received has no influence on this figure as it is taken up in the interspaces.

Charging the trench.—The first charge should be made so as to leave a vacant space of four feet at one end of the trench. To start with, cart-loads of refuse, without sorting, are tipped in from the charging platform and spread by drag rakes (figure 2) to make a

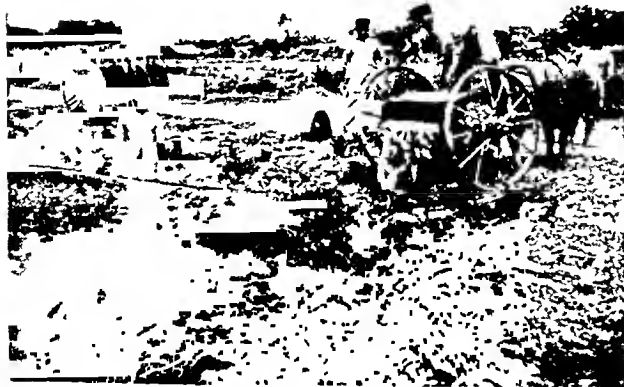


Fig 1—Charging the trench.

layer three or four inches thick. About a dozen forkfuls of inoculum from a charge at least two weeks' old is then scattered (this of course is not necessary for the first charges of a new installation) and the cartful of night-soil tipped on top, followed immediately by more refuse, tipped over the night-soil. Then the refuse, together with the night-soil below, is drawn by drag rakes in small lots until the breadth of the trench opposite is covered. About four layers per day should be made thus until the whole depth is charged in two days. The top layer for the day

and at the end of the charge should be refuse only, without being mixed with the night-soil layers beneath. This top layer should not be more than 1 inch to 2 inches thick, being intended as a coating to preserve



Fig. 2.—Spreading the charge.

uniform moisture and heat in the whole mass of the mixture, and to prevent the breeding of fly larvae on top. The next charge should be given to the adjacent portion of the trench without any interspace and so on continuously.

Proportion of night-soil to refuse.—No proportioning is necessary; whatever quantities of refuse or night-soil arrive must be treated at once, no excess of either being left over. If the proportion of night-soil is high or of a very liquid nature, the refuse layer should be spread with a surrounding raised margin until the mixing is complete. After the charge or the later turns the heaps must have flat tops and vertical sides, otherwise difficulty will arise in preventing water-logging in a wet season and in keeping uniform moisture during dry weather.

First turn.—Two days after charging is finished the first turn is given—i.e., four days from the start. A four-pronged garden digging fork has been found very suitable for this; see figure 3.

While this is being done water should be distributed from a hose or by hand upon the turned material so



Fig. 3.—The first turn.

as to soak it without permitting seepage or local water-logging. Sullage water may well be applied to the lower layers at this stage but on no account to the surface.

* A cart-load of refuse is here taken as 35 cubic feet and a cart-load of night-soil as 60 gallons.

The few fly larvae that may be found on the cool sides of the charge are turned into the heap and destroyed by the high temperature therein. If the first turn is delayed beyond four days there will be a greater development of maggots and more chance of their escaping to pupate in crevices in the walls or floor of the trench, especially in wet weather. Such pupation is usually slight and if desired can easily be checked by disinfectants.

Second turn.—The second turn is given eight days later by forking the charge over to the opposite side of the trench, adding water if necessary.

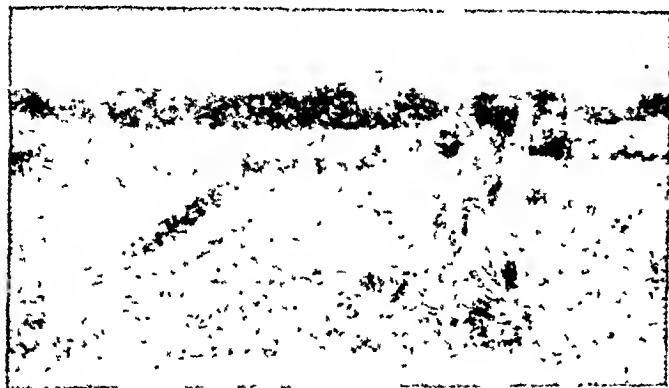


Fig. 4.—The second turn.



Fig. 5.—The third turn.

Third turn.—This should be given from eight to fifteen days after the second turn according to the stage of decomposition—when the material has crumbled to a fairly advanced degree. The mass is forked out of the trench (with watering as necessary) on to the adjacent storage ground where it may be heaped up to four feet in height.

Watering between turns.—During very hot or windy weather the upper layers may become too dry; a well-distributed surface watering should then be given.

Duration of the process.—The manure will be ready for use in from three to eight weeks after charging, the period depending on the proportion of night-soil to refuse, the correct control of moisture and air throughout and the season.

Precautions during monsoon rains.—The initial charge should not occupy the full width of the trench; a two-foot space should be left next to the partition to allow storm-water to flow. If there is risk of water flowing

into the trenches from the road the charge should be built up a foot higher, above road level. In a trench of considerable length there may be a danger of exposed corners of the heap being washed away by drainage water on the trench floor. This can be prevented by protecting such surfaces with strips of sheet iron about three feet long and suitable height. During prolonged rains it is advisable to give the third turn earlier, to prevent water-logging and slowing down decomposition.

Implements necessary.—One drag rake with four seven-inch blunt steel tines and a long handle, and one fork will be needed to deal with a daily intake of five cart-loads of refuse.

The sprinkling of water to ensure good distribution may be done, on a small scale, by throwing it with a suitable vessel such as *tagari*. For larger installations a hand pump with a hose and sprayer or even a permanent supply of piped water would be more efficient.

REFERENCES

- Anstead, R. D. (1932). Activated Composts. *Journ. Inst. Sanitary Engineers*. June.
- Brittini, A. (1923). *Uses of Waste Materials*. P. S. King and Son, Ltd., London.
- Fowler, G. J. (1903). Recent Experiments on the Preparation of Organic Matters. *Agric. Journ. India*, Vol. XXV, p. 363.
- Fowler, G. J. (1927). *Surveyor*, Vol. LXXI, p. 259.
- Hering, R., and Greely, S. A. (1921). *Collection and Disposal of Municipal Refuse*. McGraw Hill Book Co., Inc., New York.
- Howard, A., and Wad, Y. D. (1931). *The Waste Products of Agriculture, their Utilization as Humus*. Oxford University Press, London.
- Hutchinson, H. B., and Richards, E. H. (1921). Artificial Farmyard Manure. *Journ. Ministry Agric. and Fisheries*, Vol. XXVIII, p. 398.
- Jenny, H. (1928). Relation of Climatic Factors to the Amount of Nitrogen in Soils. *Journ. Amer. Soc. Agronomy*, Vol. XX, p. 900.
- Kelkar, G. K. (1909). Night-soil a Valuable Manure. *Bull. No. 34, Dept. Agric., Bombay*.
- King, F. H. (1926). *Farmers of Forty Centuries or Permanent Agriculture in China, Korea and Japan*. Jonathan Cape, London.
- Leather, W. J. (1895). The Disposal of Night-soil. *Agric. Ledger*, No. 16.
- Lyon, T. L. (1929). Organic Matter Problems in Humid Soils. *Journ. Amer. Soc. Agronomy*, Vol. XXI, p. 951.
- McCarrison, R. (1926). The Effect of Manurial Conditions on the Nutritive and Vitamin Values of Millet and Wheat. *Indian Journ. Med. Res.*, Vol. XIV, p. 351.
- Ramiah, P. V. (1933). Organic Manures and Animal Nutrition. *Agric. and Livestock in India*, Vol. III, p. 234.
- Rao, J. J., and Subrahmanyam, V. (1932). Organic Manure from Sewage, Town Refuse and Waste Vegetation. *Journ. Indian Inst. Sci.*, Vol. XV, A, p. 89.
- Russell, J., and Richards, E. H. (1917). The Changes taking place during the Storage of Farmyard Manure. *Journ. Agric. Sci.*, Vol. VIII, p. 495.
- Vishwanath, B., and Surya Narayana (1927). The Effect of Manuring a Crop on the Vegetative and Reproductive Capacity of Seed. *Mem. Dept. Agric. India, Chem. Series*, Vol. IX, p. 85.
- Williams, G. B. (1924). *Sewage Disposal in India and the East*. Thacker, Spink & Co. (1933), Ltd., Calcutta.

Medical News

MALARIA RESEARCH AND THE MALARIA COMMISSION OF THE LEAGUE OF NATIONS

This year malarialogists will have noticed the appearance of several important reports published by the Malaria Commission of the League of Nations, or under its auspices.

Organized ten years ago, the Malaria Commission began by studying the epidemiology of malaria as well as all the methods of malaria control employed in different countries in many of which the disease had assumed epidemic proportions as a result of the world war.

The first two reports of the Commission, published in 1924 and 1927, therefore deal with the epidemiology of malaria in the countries in which investigations had been carried out on its behalf, and on the principles governing the prevention of malaria. The third general report of the Commission, published this year, deals with the therapeutics of malaria and describes the present status of our knowledge of the treatment of the disease and the opinions of the Commission on methods of applying that treatment.

A report on housing and malaria by Christophers and Missiroli deals with a problem that was taken up by the Commission in 1928. Another subject, malaria in the deltas of large rivers, has been investigated for several years by members of the Commission. Reports have been published on the deltas of the Danube, the Ebro and the Rhine, followed by a memorandum on certain general considerations on the problem. In these papers has been summarized our present knowledge on these three subjects, but as that knowledge is still far from complete, and malaria research still actively in progress, the Commission feels that lines of further investigation should be indicated in order to point out the problems most urgently calling for solution.

The full list of questions on which the Commission recommends that research should be undertaken is given below. It will be noted that all the problems are classified under the three subjects which have been investigated for many years, viz, treatment of malaria, housing and malaria, and malaria in deltas.

The study of these problems is not the monopoly of the League Malaria Commission. The members of that Commission feel strongly that they should draw the attention of investigators all over the world to the importance of these problems. No malarialogist denies that malaria is essentially a local problem; no countries are alike as regards malaria. Therefore, the results of any investigation applies as a rule only to the country where it was made, and, if conclusions of a more general value are to be reached, the observations and controlled experiences of different national investigations should first be pooled.

For example, immunity to malaria varies, of course, according to the greater or lesser opportunity of repeated infection, to the virulence of the strain, to the number of sporozoites inoculated, and so on. Malaria therapy offers a good opportunity for the study of this problem, but it is of the greatest interest to know if a strain of, let us say, *P. vivax*, which has proved very virulent in England, has the same virulence in Roumania, or in Italy; or if a Roumanian strain towards which patients have become immune in Roumania, as the result of repeated inoculation, protects against the English strain, and vice versa.

The international co-ordination of research into malaria has proved to be of the greatest value; to carry it out, however, would be difficult, if not impossible, without the existence of an international organization of some sixty members and corresponding experts like the Malaria Commission of the League.

The following is the list of questions recommended for further investigation:—

I. Treatment—clinical and therapeutical research work:

Determination in hyperendemic and endemic regions of the age groups most seriously affected by the disease and consequently requiring most attention in the matter of treatment. Investigations should cover in the first place the indigenous population and then be extended to immigrants.

Determination of the minimum dose of quinine sufficient for the treatment of the disease in hyperendemic and endemic areas where the natives have attained a certain degree of immunity.

Ascertainment of the dosage (by age groups) of plasmodium sufficient to prevent the gametocytes from infecting the anopholes and the intervals (per week) at which it should be administered.

Determination of the extent, if any, to which the therapeutical action of quinine is increased by the administration of plasmodium (combined medication).

A beginning should be made with laboratory research on cases of induced infection before proceeding to apply this method in the field.

Continuation of clinical tests with both types of 'totaquina' in accordance with the method laid down in the report.

Experiments in malaria control by means of medicaments alone without the application of anti-anopheline measures.

Blackwater fever: investigation of the relations between quinine and blackwater fever by means of experiments on animals (malaria in monkeys).

Housing and malaria.—Biology and geographical distribution of the different varieties of *Anopheles maculipennis*.

Study of the following species of tropical anopholes from the point of view of a possible differentiation of races:

(a) *A. hyrcanus* and its several varieties (though widely disseminated, this strain is not as a rule very dangerous, though it may become so in certain countries, and especially Sumatra).

(b) *A. bifurcatus* (unimportant in Europe, but dangerous in Palestine).

(c) *A. ludlowi* var. *sundaicus* (dangerous everywhere, though there is a great difference between its breeding places on the coast of Java and in the interior of Sumatra).

(d) *A. gambiæ* (dangerous everywhere, though its breeding places differ in the Union of South Africa and Tropical Africa).

Causes of the very great variations met with in the distribution of malaria in certain tropical regions—such as the phenomenon of immune areas in the immediate vicinity of hyperendemic areas—and in particular the possibility of a relation existing between this phenomenon and the deviation of the anopholes.

Investigation of the factors which make certain rice-growing areas highly subject to malaria while others remain immune.

Study of the African anopholes and the connection between the various species of anopholes and malaria in Africa.

Malaria in deltas.—Initiation or pursuit of research on the varieties of *A. maculipennis* found in European deltas in connection with malarial foci (Danube, Ebro, Rhine, Rhone, Po).

It is suggested that Indian, Siamese and Indo-Chinese malarialogists might usefully conduct similar investigations with regard to the races of malaria-carrying anopholes in the deltas of their respective countries.

Investigation of the influence of agriculture on the domesticity of anopholes and on malarial endemicity.

Study of live stock in connection with local anophelism and the disease.

Historical study with special reference to malaria, of variations in the topographical and demographical characteristics of deltas.

Investigation of the degree of susceptibility to malarial infection of inhabitants of deltaic areas.

ACTA AEROPHYSIOLOGICA

The new periodical *Acta Aerophysiologicala* is dedicated to research work concerning the influence of aeronautics and mountaineering on man. It deals with very practical problems, as flying, from being an occupation of few, is gradually becoming a sport for many. For all those who are interested in aeronautics, accurate information on the influence of flying on the human body is of prime importance.

This periodical intends to deal with those problems on an international basis. In almost all countries of the world special collaborators have promised to assist. The first issue shows the importance of the new series. In about a hundred pages different subjects connected with the medicine of aeronautics are dealt with in many interesting and profusely illustrated essays.

The editor of the *Acta Aerophysiologicala*, Prof. Dr. Ludolph Brauer, Director of the 'Allgemeines Krankenhaus' Hamburg-Eppendorf, has succeeded in making the periodical so interesting that a wide circulation may be confidently expected.

The paper is published by Broschek & Co., Hamburg 36, and sold by Conrad Behre Hamburg 1, Kleine Johannisstrasse 19, where the first issue may be ordered for RM 3. and further information concerning the periodical may be obtained.

ABSTRACTS OF THE MINUTES OF A MEETING OF THE BENGAL COUNCIL OF MEDICAL REGISTRATION, NO. 67, DATED THE 27TH JULY, 1933

GOVERNMENT of Bengal Notification announcing the election of the undermentioned gentlemen as members of the Bengal Council of Medical Registration was recorded:—

Dr. Bhupendranath Bandyopadhyay, L.M.P.
Dr. Amulyadhan Mukhopadhyay, L.M.F.
Rai Sahib Dr. Prabodhehandra Ray, L.M.P.
Lieut.-Col. N. C. Kapur, I.M.S., *vice* Major S. N. Mukherjee, I.M.S., deceased.

Government of Bengal Notification announcing that the possession of the M.B., B.S. degree of the Rangoon University should entitle any person to have his name entered in the Register of Registered Medical Practitioners maintained in Bengal was recorded.

The undermentioned gentlemen were nominated representatives of the Council and the Governing Body of the State Medical Faculty of Bengal on the Bengal Sanitary Board:—

(a) Dr. Taraknath Majumdar, L.M.S., D.P.H., D.T.M., F.C.S., F.R.S.E.

(b) Dr. T. Ahmed, M.B., D.O.M.S., F.R.C.S.

It was decided that the undermentioned schools be inspected during the next six months:—

(a) Dacca Medical School.

(b) Lytton Medical School, Mymensingh.

(c) Calcutta Medical School.

(d) Jackson Medical School, Jalpaiguri.

Motions to the following effect by Dr. Amulyadhan Mukherjee, L.M.F., were considered, and decisions taken as indicated below:—

(a) (i) That a committee be appointed to inspect medical examinations of the State Medical Faculty of Bengal.

(ii) That legal opinion be taken as to whether the Council has power to inspect medical examinations held by the universities.

The motion was modified by Dr. K. S. Ray, M.B., Ch.B., and passed as modified.

(b) That Government be requested to put a stop to the continuance of unauthorized medical schools which turn out a large number of bogus medical men with positive mischief to the community and the profession. Passed.

(c) That employment of unregistered practitioners by local self-governing bodies be put a stop to, as contrary to the provision of section 31 of the Bengal Medical Act. Passed.

(d) That the maximum number of students fixed to be kept in recognized medical schools be calculated on an average basis during session July to June.

This motion was referred to the inspection committee for consideration and report.

Entry of the qualification D.M.R.E. (Cantab.) was sanctioned under section 21 of the Bengal Medical Act, 1914, against the name of Dr. Pareschandra Chakrabarti.

Entries of the qualifications, D.T.M. & H. (Cantab.), D.T.M. & H. (R.C.P.S.) and D.T.M. (Liverpool) were sanctioned under section 21 of the Act against the names of Drs. Jitendramohan Ghosh, Mohan Chand Madhok and Shrikant Shamsar Singh, respectively.

The Registrar's report that Satishchandra Datta was convicted under section 5 of the Indian Medical Degrees Act, 1914, and sentenced to a fine of Rs. 100 by the Deputy Magistrate of Dacca was recorded.

In connection with an application for the recognition of the Bengal Medical Institution and Hospital, Beliaghata, Calcutta, the principal of the institution was directed to furnish information on the return form prescribed by the Council and the return submitted was referred to the standing inspection committee for consideration and necessary action.

The Council expressed sorrow at the sad and untimely death of Major S. N. Mukherjee, I.M.S., a member of the Council for a number of years and resolved to send a message of condolence to Mrs. Mukherjee.

THE INDIAN HONOURS LIST

1ST JANUARY, 1934

The following are the names of medical workers in the Indian Honours List of date 1st January, 1934. We offer them our congratulations.

C.I.E.

Lieutenant-Colonel A. D. Stewart, Director, All-India Institute of Hygiene and Public Health, Calcutta.

Lieutenant-Colonel R. N. Chopra, Professor of Pharmacology, School of Tropical Medicine, Calcutta.

Kaiser-I-Hind Gold Medal

Miss A. I. Burton, Lady Superintendent, Minto Nursing Association, Murree.

Miss C. Falkiner, Lady Superintendent of Nursing, Medical College Hospitals, Calcutta.

Mr. S. P. Shroff, Eye Specialist, Delhi.

Kaiser-I-Hind Silver Medal

Miss M. Bazeley, St. Stephen's Mission Hospital, Delhi.

Miss J. Hogg, Mure Memorial Hospital, Nagpur.

Miss E. B. Holloway, Lady Dufferin Hospital, Bettiah, Bihar and Orissa.

Sister M. I. Lundin, King George's Hospital, Vizagapatam.

Miss A. M. Quinn, Lady Lyall Maternity Hospital, Agra.

Mr. Bepin Bihari Brahmachari, Director of Bengal Public Health Laboratory, Bengal.

Mr. B. A. Irvine, Governor's Staff Dispensary, Bengal.

Khan Sahib

Muhammad Maizuddin Khan, Assistant Surgeon.

Rai Sahib

Babu Ramesh Chandra Ganguli, Civil Assistant Surgeon, North Lakhimpur, Assam.

FAR EASTERN ASSOCIATION OF TROPICAL MEDICINE. 9TH CONGRESS

THE 9th Congress of the Far Eastern Association of Tropical Medicine will be held at Nanking, China, from the 2nd to the 8th October, 1934.

All licensed medical, dental and veterinary practitioners are eligible for membership. The membership fee for the period 1930-1934 is £3 and should be paid to the local provincial secretaries of the Far Eastern Association of Tropical Medicine, to whom the names of members in their areas should be submitted. The members are also requested to inform the local secretaries

whether they propose attending the conference. The titles of any papers which it is proposed to place before the conference should be submitted to the local secretaries at an early date. Arrangements will be made for the reading at the Congress of any paper submitted by a member who is unable to attend.

Further information may be obtained from the local provincial secretaries or from the local secretary for the Government of India, Malaria Survey of India, Kasauli, Punjab, British India, or the Honorary General Secretary, Far Eastern Association of Tropical Medicine, Batavia-Centrum, Java.

Current Topics

Anæsthesia in Midwifery: A London Experiment

(From the *British Medical Journal*, 11th November, 1933, p. 884)

THE London County Council sanctioned in the early part of last year the experimental engagement of six extra assistant medical officers for the purpose of administering, in the Council's hospitals, light anæsthesia in normal labour. The six officers took up their engagements in July 1932, and the engagements, originally for six months, have since been three times renewed. The choice of anæsthetic was left to the discretion of the medical superintendent, and chloroform, gas and oxygen, ether and ethyl chloride, and nembital, alone or in combination with sedatives, have all been given extensive trial. In the eight hospitals to which special anæsthetists were for varying periods attached 3,729 patients were delivered under light anæsthesia up to April 1933. The unanimous opinion of the medical superintendents of these hospitals is that a properly chosen and administered anæsthetic does not materially delay labour and has no detrimental effect on mother or child. At one hospital only was it considered that a slight, but definite, delay occurred. Even at two hospitals originally selected which were found unsuitable for the experiment, and from which the anæsthetists had to be withdrawn, no actual detriment to the patient was alleged. In only two cases in the whole series was it suggested that a necessity for forceps might have been due to the anæsthetic. Of other complications associated by certain obstetricians with the use of maternal anæsthesia there has been no trace, nor has any increase of puerperal morbidity been noted in any hospital.

As for the relative merits of the anæsthetics employed, it is reported that no one method stands out from the others, but all have their advocates. The records have incidentally shown the great value of analgesics in labour. The skilful administration of chloral or morphine, alone or in combination, has proved invaluable for conserving the patient's strength, diminishing fear and shock, and blunting the recollection of labour. In April 1932, the use of crushable chloroform capsules containing 20 minims of chloroform was sanctioned. The use of these was ultimately adopted in fifteen of the Council's hospitals, and has become increasingly popular. All the hospitals concerned, with one exception, presented a favourable report. Out of 1,121 patients whose opinion was recorded, 613 considered the capsules of great use, 446 of some use, and only 62 reported that they had been of no use. In no instance was it alleged that their employment led to the application of forceps. The only substantial disadvantage was found to be that a number of patients were noisy and difficult to control, a trouble easily surmounted under hospital conditions, but a serious consideration for midwives in private practice. The

administration of the capsules has been delegated to the maternity sisters and their deputies under certain defined conditions. They were administered in 2,643 cases.

In a report on the experiment the Central Public Health Committee states that anæsthesia in labour is still outside the experience of the class of woman coming into municipal hospitals, and to many of them it is associated with obstetrical disasters. The suggestion of its use arouses a fear that the doctor anticipates an abnormal labour. There is also a curious belief current that a woman is doing something morally wrong in evading the pain of labour. By the women who manage to overcome their initial fears anæsthesia is received with deep gratitude. As a result of two years' experience, during which period a total of 4,540 cases (including the 3,729 delivered at hospitals to which special anæsthetists were attached) have received light anæsthesia in normal labour, it is considered that the experiment has justified itself. The demand from the women concerned was sufficiently strong and widespread to make the offer of some form of anæsthesia in normal labour an urgent public question. The obstetrical difficulties were much less than anticipated, though the administrative difficulties were greater, for the irregular distribution of the births over the twenty-four hours made it impossible to ensure that an anæsthetist was always available, and this form of administration is not readily combined with other duties. It is considered that the use of crushable chloroform capsules or some safe and simple equivalent should be relied upon as the usual method of anæsthesia for normal cases, where the medical superintendent is willing to delegate this duty to the senior nursing staff. The duty of administering or supervising the administration of analgesics and anæsthetics should be regarded as part of the normal duty of a medical officer in charge of the maternity ward.

Present Status of Various Spinal Anæsthetics and their Clinical Usefulness

By F. W. MARVIN, M.D.

(Abstracted from the *Journal of the American Medical Association*, 4th November, 1933, Vol. CI, p. 1475)

As a result of its satisfactory employment in both the bad and the poor risk cases for operative procedures, spinal anæsthesia became at first tolerated, later accepted, and now appreciated. The hazards of spinal anæsthesia have been so largely overcome and its noxious effects on the circulation have been placed under so much better control that its use in surgery is fully justified. Hence, it behoves one to use it frequently in the good operative risks. This change is gradually taking place, so much so that the old fallacy of using spinal anæsthesia in only poor general

risks or nearly moribund patients should be practically extinct.

Statistics both here and abroad show that subarachnoid block is becoming more popular through its continuous use in clinics which are staffed with anaesthetists specially trained and experienced in its use.

The use of spinal anaesthetics requires an accurate and precise technique for uniform results. I strongly

(benzoyl-gamma [2-methylpiperidine] propanol hydrochloride), nupercaine, and pantocain (para-butylamino-benzoyl-dimethyl aminoethanol hydrochloride).

The relative toxicity of these drugs as observed clinically are, in the order named: nupercaine, neothesisin, procaine hydrochloride and pantocain. The reactions peculiar to these drugs may be summed up briefly as depicted in the table below:—

	Posterior root block	Anterior root block	Change of blood pressure		Heart rate	Respiratory depression	Nausea	Headache
Procaine hydrochloride.	Immediate	Immediate	Definite drop 20 to 30.	initial	Slight slowing.	No	No (small doses).	No
Neothesisin ..	Slight delay	Slight delay	Definite drop 20 to 30.	initial	Slight slowing.	Appreciable	No	No
Nupercaine ..	Delayed	Delayed	Definite drop 30 to 50.	initial	Marked slowing.	Change	Slight	Few reported.
Pantocain ..	Immediate	Immediate	Appreciable drop 0 to 10.		No change	No	No	No

advise every one to employ his own technique in his own clinic. Not every new method that comes along should be adopted. If an anaesthetist has good results he should continue with his technique but, on the other hand, he should not be contented to squat and ignore the newer and better preparations with the improved methods of application.

Drugs formerly used in spinal anaesthesia are now being replaced by newer and less toxic ones which give better and more satisfactory anaesthesia. Nearly every drug employed as a local anaesthetic has been injected into the subarachnoid space. Forty-nine years ago, cocaine was the first local anaesthetic introduced. The high toxicity of cocaine precludes its use in spinal anaesthesia. It is said, however, as a standard to gauge the toxicity of the other drugs. Cocaine, having fallen into disuse, was supplanted by several drugs, of which I shall mention tropacocaine hydrochloride, stovaine, procaine hydrochloride and others.

Tropacocaine hydrochloride has been used quite extensively in the past. It has a toxicity about half that of cocaine, but its duration of action is much shorter. To be effective, it must be used in a fairly concentrated solution. Because of its high toxicity and rather uncertain analgesia, tropacocaine hydrochloride has been gradually discarded.

Stovaine, prepared by Fournneau in 1904 and brought into general use by Barker in 1906, has enjoyed great popularity, especially in France. It is powerful, and it produces marked muscular relaxation. There are, however, certain disadvantages in that it is more irritating to the connective tissues and nerve fibres. Headaches of rather severe intensity are noted frequently after its use. It deteriorates rapidly and must be kept in special containers.

Spinocaine (a brand of procaine hydrochloride with strychnine sulphate), introduced by Pitkin six years ago, gained a wave of popularity at first but of late it has been more or less replaced by procaine hydrochloride. The fact that it is of lighter specific gravity than the spinal fluid caused several accidents, which could have been avoided had more care and precaution been used and had better instruction been given as to its installation. The claims made for its very complete control are plausible, but I have not used it for the past three years.

Toxicity is the first question that surgeons ask whenever a new drug is introduced into a clinic. The Boston City Hospital has adhered always to the principle of having a complete knowledge of the toxic action of these drugs, which have been furnished by the manufacturer and carefully checked up by the hospital's research department. After a careful survey and use of the several drugs, we confined our study to the following four: procaine hydrochloride, neothesisin

A comparison of these drugs as to their relative difference in dosage and the length of anaesthesia that they produce is below:—

Drug	Dosage	Duration of anaesthesia
Procaine ..	200 mg.	One hour.
Neothesisin ..	160 "	Ninety minutes.
Pantocain ..	20 "	Two hours.
Nupercaine ..	10 "	Three hours.

The clinical usefulness of these drugs might well entail a lengthy discussion, but space will not permit. I shall enumerate briefly what I consider the practical use of these drugs: All operations below the diaphragm may be performed under spinal anaesthesia. Apparently there is no limitation to the number of spinal anaesthetics that a patient may undergo. To substantiate this statement, I have an authentic report that spinal anaesthesia was administered ten times within a period of fourteen months to one patient without any apparent deleterious effects.

Genito-urinary surgery offers a field in which we use spinal anaesthesia as a routine, so satisfactory have been our results. Prostatectomies are performed with very small doses of the anaesthetic drug. For example, we never use more than 60 (usually 50) mg. of procaine hydrochloride. When pantocain is used, the dosage varies from 8 to 10 mg. with satisfactory anaesthesia. The first stage operation (a double vasectomy and cystotomy) with procaine hydrochloride shows a drop in blood pressure. The second stage, performed two weeks later with pantocain, shows no drop in blood pressure. To substantiate further the clinical usefulness of these drugs in genito-urinary surgery I shall illustrate with cases in which there were definite complications other than the genito-urinary pathologic changes. A second stage prostatectomy was performed on a man, aged 78, who had endocarditis and myocarditis, with a previous history of six anginal attacks. We advised the first stage under local anaesthesia and the second stage under spinal anaesthesia using pantocain. In a case of renal calculi of the left kidney in a woman who was four months pregnant and weighed 180 pounds (81.6 Kg.) and was 5 feet (152.4 cm.) tall, the stones were removed, and she expects the baby next month. Another satisfactory case in this group was that in which an octogenarian in his eighty-fourth year had a bladder stone the size of a goose egg and a prostate larger than a lemon removed under pantocain.

The relaxation afforded by spinal anaesthesia renders operative procedures less difficult and minimizes the

shock. The safety of these drugs as compared with general anesthetics is highly desirable in genito-urinary surgery because they do not seriously interfere with the kidney function.

Abdominal, gynecologic and orthopedic surgery of the lower half of the body vary a great deal in their types of operations and the length of time they consume. The use of spinal anesthesia in obstetrics may be dismissed with the statement that we do not advise its use unless a definite pathologic complication exists. We have used it seven times during the past year in private cases without a fatality. All of the patients had definite pathologic conditions of the chest.

All four of these drugs have been used on both males and females; the youngest patient was a girl, aged 8 years, while the oldest was the octogenarian. Their weights varied from 70 to 340 pounds (31.8 to 154.2 Kg.). Gastric and intestinal surgery of all types, including resections for carcinoma, are included in our series. Carcinoma of the sigmoid was completely removed in one stage. A right colectomy was done with anastomosis of the terminal ileum to the transverse colon. This patient is well and working. Gallbladder surgery was performed with great ease, as were the long and tedious umbilical and ventral herniotomies. We have a large series of the so-called double operations in gynecology. Included in the orthopedic operations may be mentioned two spinal fusions and many fractures, including one patient who had both femurs broken. All surgery of the lower extremities, including diabetic cases, and the different circulatory diseases in which spinal anesthesia was given for diagnosis, was performed under spinal anesthesia with satisfaction.

CONCLUSION

We have used each of these drugs in our series at the Boston City Hospital during the past sixteen months without a fatality. These drugs have been used separately and in different combinations for very definite purposes, with the result that we have formed a strong opinion that it is not necessary to mix them. We advise the use of them separately for each individual case. Procaine hydrochloride and pantocain are the drugs frequently employed. Of these two drugs, pantocain offers everything that procaine hydrochloride will accomplish and has the advantage that it does not lower the blood pressure as does procaine. Furthermore, clinically, it is apparently less toxic than procaine hydrochloride, besides producing a longer and more satisfactory anesthesia.

Empyema

By J. W. LINNELL, M.C., M.D., M.R.C.P.

(Abstracted from the *Medical Press and Circular*, 4th October, 1933, New Series, Vol. CXXXVI, p. 321)

(1) WHEN TO DRAIN

EMPHYEMATA can be caused in a multitude of ways and through the agency of many kinds of infecting organisms, but it is only with the two commonest types, those complicating the pneumococcal and streptococcal pneumonias, that we shall deal. There is a very great difference in their development and course. It is ignorance of this fact that results in the principles of treatment commonly and correctly applied to the one being so often applied to the other—with disastrous effects.

Broadly speaking, a pneumococcal empyema is 'meta-pneumonic', i.e., it develops *after* the subsidence of the acute pneumonic process in the underlying lung. A streptococcal empyema, the type usually met in influenza epidemics, on the other hand, is 'syn-pneumonic', i.e., it develops simultaneously *with* the pneumonic process in the underlying lung. In pneumococcal cases adhesions form rapidly between the two layers of the pleura at the margins of the effusion; the

latter is thereby walled off early from the general pleural cavity and, moreover, rapidly develops into thick 'laudable' pus. In streptococcal cases the adhesions take much longer to form, and the effusion, besides being more copious, remains thin and seropurulent for a very considerable period.

In pneumococcal cases, at the time of the commencement of the suppurative process in the pleural cavity, the antibodies are in the ascendant, the system is no longer grossly poisoned, the temperature has usually been down for some days, and the patient is comparatively well. In streptococcal cases, at the time of the onset of the empyema, the antibodies are not yet mobilized, the system is still severely poisoned, the temperature is still high, and the patient is usually desperately ill, dyspnoic, and cyanosed.

To drain early in a pneumococcal case is nearly always safe, for it usually means no more than the evacuation of a well localized abscess in a comparatively fit subject. To drain early in a streptococcal case is often disastrous, for it means producing a more or less complete pyo-pneumothorax and submitting a patient already in a precarious state to all the added dangers connected with such a condition.

What then is the proper treatment of a streptococcal case? Surely it is to help tide the patient over the acute pulmonary condition, relieving any distress that may arise meanwhile through the size of the effusion by aspirating, until here, too, a well localized abscess containing thick pus ripe for evacuation has developed. Arguments such as these were brought forward in the celebrated report of the American Empyema Commission which investigated the causes of the high mortality rate obtaining in cases of empyema during the big epidemic of hæmolytic streptococcal infections of the respiratory tract in the military camps situated in various parts of the U. S. A. during the winter of 1917-1918. At the hands of the Commission the rate fell from 30.2 per cent to 4.3 per cent, and all over the world since then its findings have been verified by further experience.

In actual practice, whether the case be pneumococcal or streptococcal in origin (and we would insist that it is not always possible to be sure without laboratory facilities), the one indication that the time has arrived to drain is the finding of frank 'laudable' pus by aspiration. As a rule the necessary thickness can be easily gauged in a moment by inspection, but if there be any doubt on the subject, a sample of the aspirated fluid can be collected in a test-tube and allowed to stand for twelve hours; if then there is over 75 per cent of deposit, it is safe to resect a rib and drain. As a matter of experience the interval between the onset of the effusion and the development of frank pus in streptococcal cases is generally two to three weeks; on an average four aspirations are carried out in that time, and on each occasion enough should be removed to relieve distress.

Coming to the actual technique of aspiration, there are certain points to keep in mind. The site, for instance, should be chosen with a view to the future operation. On every occasion the tissues should be thoroughly anesthetized all the way down to the pleura; for this about 10 cubic centimetres of a 1 per cent solution of novocain are required. If much fluid has to be withdrawn, a two-way stop-cock attached to an ordinary 20 cubic centimetre syringe will be found of considerable assistance, and a rubber connecting-tube between the syringe and the needle will prevent the latter from being pushed in and out if the patient moves.

It is curious how comparatively seldom repeated aspirations of streptococcal pus cause anything but trifling infection of the chest wall. Nevertheless, severe cellulitis does occasionally result, especially if there be a superadded anaerobic infection; and even a mild inflammation may be a source of considerable pain to a nervous and debilitated patient. To obviate this Mr. Tudor Edwards has devised the following procedure,

which it may be well worth while to remember: After the first aspiration the line of the needle track is opened up with a sharp knife by an incision one inch long, which goes through the skin and muscles down to the level of the ribs. The wound is packed with vaseline gauze, and not only can future aspirations be performed through it without local anaesthesia, but the granulation tissue which develops in it generally forms an effective barrier against infection of the surrounding tissues, and when the time arrives for rib resection, it can be extended and used as the way of approach.

Whatever method of aspiration be used, directly the pus is found to be up to standard as regards consistency, operation should be no longer delayed. Adhesions form slowly in streptococcal cases, but once they form they organize quickly and tend to bind down the lung and delay re-expansion.

We do not propose to discuss the details of the operation and after-treatment in this paper, save as regards the removal of the drainage tube, but we should like to say that we do not regard them as matters of minor importance fit to be left in inexperienced hands. Failure to observe small points in technique can be the means of prolonging the patient's illness from weeks to months.

(2) WHEN TO REMOVE THE DRAINAGE TUBE

The tube should be so adjusted that its inner end is just inside the empyema cavity, after which it should be transfixed at the level of the skin with a safety-pin and maintained in position by affixing this to the chest wall with adhesive strapping. It is a common practice to remove the tube daily for cleansing; this is, however, quite unnecessary; once a week is often enough. The calibre of the tube may be reduced, but it is most important that it should not be finally removed till the lung has completely expanded and entirely obliterated the cavity.

It is well to estimate the size of the cavity from time to time in order to find how the obliterative process is proceeding. There are three simple ways of doing this: (a) introducing a gloved finger into it through the drainage opening; (b) probing it with a uterine sound, a soft metal gall-stone probe, or a urethral bougie; (c) making the patient lie in such a position that the drainage opening is its highest point, and then slowly introducing sterile fluid (e.g., boiled water) with a graduated syringe.

Statements to the effect that the tube prevents the lung from expanding, and that it should be removed as soon as the discharge is no longer purulent, are quite untrue; yet they are still, unfortunately, to be found in some of the textbooks. By far the commonest cause of chronic empyema is the removal of the drainage tube before the cavity is obliterated. In such cases pus re-accumulates, and sooner or later either discharges itself spontaneously through the old drainage site or has to be released by operation. Too often the doctor, not appreciating the real cause of the re-accumulation of pus, again removes the drainage tube too early, and the same story is repeated time and time again, the underlying lung becoming meanwhile imprisoned by a thicker and thicker layer of fibrous tissue, until in the end obliteration of the cavity becomes impossible without an extensive operation.

In conclusion, we would say that it is our experience that empyemata such as we have described, recognized early and treated efficiently, are usually completely cured under two months.

Nembutal in Labour A Record of One Hundred Cases of Nembutal and Chloral Narcosis

By FRED A. C. KELLY, M.R.C.S. (Eng.)

(Abstracted from the *Lancet*, 23rd September, 1933, p. 690)

THE following is an analysis of 100 consecutive cases of nembutal and chloral given to women in labour in

the obstetric unit at University College Hospital. Acting on the experience of O'Sullivan and Craner the following rules were formulated:—

A. Nembutal grs. 3 to be given to *primiparæ*: (1) when the os uteri is about three fingers' dilated and there are fairly strong pains at about five minutes' interval; (2) if the patient is distressed with strong pains, even if they are not occurring every five minutes, and the os three fingers' dilated.

B. Nembutal grs. 3 to be given to *multiparæ*: when the os uteri is about two fingers' dilated if there is distress. Nembutal grs. 1½ to be repeated once after three hours if labour is progressing and the pains are strong and regular. Chloral hydrate grs. 22 in all cases to be given twenty minutes after each dose of nembutal.

These doses vary a little from those given by O'Sullivan and Craner. They gave grs. 30 of chloral hydrate ten minutes after the initial dose of nembutal grs. 3, and their first repeat dose of nembutal grs. 1½ after two hours, and subsequent doses of both chloral hydrate and nembutal after three hours, up to but not exceeding a dose of grs. 7½ of nembutal in twelve hours. The modification in this series was considered advisable because the administration, timing, and dosing were left to the discretion of the labour ward sister. When it was found necessary to exceed the dose of nembutal, grs. 4½, medical permission was obtained. Chloroform or gas-and-oxygen was, with rare exception, given in all cases for delivery.

Women admitted in labour have, in normal cases, two vaginal examinations: on admission and when the membranes rupture. Therefore it is often difficult to state with accuracy the exact stage of dilatation of the os uteri when the first dose was given. For this reason in this analysis the times are worked out in hours before delivery.

In some cases, when the patients were admitted very early in labour before the pains were regular or frequent, 3 1 of the following mixture was given, in addition to a subsequent dose, or doses, of nembutal and chloral: pot. brom. grs. 25; chloral hydrate, grs. 25; tinct. opii η 7½; aq. chlorof. ad ξ 1.

There was no alteration in the ordinary management of the first or second stage of labour, except that after the administration of the nembutal the patients were not allowed out of bed. They were encouraged to sleep, but no precautions were taken to darken the room or ensure more than ordinary quiet. Further, the foetal heart was examined hourly and frequent blood-pressure records were made. Patients well under the sedative and sleeping quietly were frequently left alone for a few minutes at a time; mention will be made later of the restlessness sometimes met with, in which it was impossible to leave the patient at all.

THE PATIENT'S POINT OF VIEW

The matter was discussed with each patient 24-48 hours after delivery. All could remember being given some drug to drink, and whether or not there was any change in the pain after it. It is interesting to note that the same phrases occurred again and again in these women's description of their labours. 'I went to sleep at once and I didn't remember anything till I heard the baby cry.' 'All I remember was being given stuff to smell.' 'I felt things as though it was a dream, and there was no pain at all.' 'I was helped a lot.' 'It made the pain worse and the baby came at once.' There is a large clock in each labour ward, and one or two of the more intelligent women could remember the time they were 'given their drink' and the time when they woke up again. This was unusual.

Of these 100 cases, 62 were completely successful from the patient's point of view. The cases were classified in five groups as follows:—

- (a) *Very good*, 35. Complete or almost complete amnesia and complete analgesia.
- (b) *Good*, 27. Marked but incomplete amnesia and complete analgesia.
- (c) *Fair*, 21. No amnesia, but definite analgesia.

(d) *Poor*, 4. No amnesia, slight analgesia, quickly passing off.

(e) *Failures*, 13. Neither amnesia nor analgesia.

From these figures, therefore, in 62 cases the desired effect was obtained, in 21 the effect was very incomplete, and in 17 the drug was without effect.

THE ATTENDANT'S POINT OF VIEW

At University College Hospital women in labour are examined in the admission room. They are then transferred to the first-stage ward, which is capable of accommodating three women, and when in the second stage are transferred to a second-stage ward. The labour wards (second-stage wards) have only one bed. A normal labour is under the supervision of the labour ward sister only.

It was not found necessary to vary these arrangements with regard to patients under nembutal and chloral, except in the cases which were very restless. These were moved from the first-stage ward to the second-stage ward rather sooner than usual and not left alone. Those who responded well were left for a few minutes at a time. No case gave rise to particular anxiety. There was no fall in blood pressure or undue narcosis produced by the drugs. No case became maniacal. From the attendant's point of view the patients have been divided into four groups.

(a) *Easy to manage*, 61. These patients slept between their pains, and responded to instructions when required. They could be roused to be examined, but when left alone slept quietly. With the pains they were roused, and were rather more apt to wriggle than the usual patient without nembutal. They were not noisy, but there was a tendency to weeping and lack of control.

(b) *Fairly easy*, 12. These patients were drowsy between their pains, but were noisy with the pains, and could not be roused as easily to make use of the pains.

(c) *Difficult*, 17. The patients were noisy and restless, weeping and miserable even between the pains.

(d) *Very difficult*, 10. These cases were extremely noisy and restless. They required constant attention and would not respond to directions in any way.

The disposition of the patient apparently made a difference. In (a) 47 were placid, 14 nervous; (b) 6 were placid, 6 nervous; (c) 5 were placid, 12 nervous; (d) 0 were placid, 10 nervous. This statement is of course not absolute, as in the 'difficult' group there were 5 patients who were placid and quiet though distressed with the pains. After the administration of nembutal and chloral they became noisy and restless. It was found, however, to be a good working rule that placid patients would respond well, and the labour ward sisters, after some experience with the drug, could foretell fairly accurately which patients would be troublesome during the second stage. At this point it is interesting to note that the disposition of the patient has apparently a definite bearing on the success or otherwise of the drug from the patient's point of view. Of the 62 successful cases from the patient's side, 40 were placid in nature and 22 nervous, while in the 17 cases in which the drug was found to be without effect 4 were placid and 13 very nervous. Further, in 5 of these 13 cases, the nervousness was made worse by the initial dose of nembutal so that the repeat dose had to be withheld. Even though a patient became restless and unhappy after her first dose of nembutal and chloral it by no means followed that the amnesia would be incomplete. One or two of the worst cases of restlessness, which were exceedingly noisy throughout, had nearly complete amnesia. 'They tell me I made a noise, but I don't remember anything about it.' Hence it seems fair to argue that a repeat dose given to the restless patients would have produced a certain degree of success. It was, however, impossible to give this dose because of the fear that the patients would roll off the bed; further, they could not be induced to make use of their pains.

One patient was rather more than usually sleepy next day; the others were perfectly normal. They all

slept through the third stage. Chloroform or gas-and-oxygen was given for the deliveries in all cases except two, the average time of administration being about ten minutes, just for the actual predelivery pains, crowning, and birth of the head and shoulders. About 20-30 of chloroform was usually required. This amount was of course increased for forceps delivery. The number of perineal tears resulting was small. The temperature, pulse rate, and blood pressure of the patients after delivery were apparently not affected by the nembutal and chloral.

EFFECT ON THE PAINS

In 71 cases the strength and frequency of the pains were unaffected. Labour progressed normally and delivery took place within the expected time. In 9 cases there was considerable strengthening of the pains following the nembutal and chloral, and delivery took place with some rapidity. As this occasionally happens with patients who have had no preliminary sedative it seems doubtful if the strengthening should be regarded as a direct effect of the drug. O'Sullivan and Craner, in their series of 60 cases, had 3 in which a similar strengthening was observed.

In 20 cases labour was apparently lengthened. In 7 of the 20 the frequency of the pain was diminished, the intervals between pains lengthening from about three to five minutes, or four to six minutes. In 8 the strength was diminished. In 5 both strength and frequency were diminished. Fourteen of these 20 cases terminated in spontaneous deliveries, and the lengthening of the second stage gave rise to no anxiety. Six cases terminated in forceps deliveries. Forceps were applied for weakening pains and a lengthy second stage.

In this series of 100 cases there were 10 forceps deliveries. In 6, as stated above, forceps were applied for delayed second stage owing to weakening pains, but in 4 of the 6 the membranes ruptured very early, and it seems fair to assume that labour would have been long whether or not nembutal had been given. In the remaining 4 cases there was no weakening of the pains; in 1 of them there was some disproportion and the case was a trial labour, and in 3 the position was an unrotated occipito-posterior. The average for forceps deliveries at University College Hospital is about 9 per cent; this series, therefore, shows a slight increase. In spite of the prolonging of the labour 9 of these 20 patients had complete analgesia, 5 had fair but incomplete relief from the pain, 3 had very slight analgesia, and 3 had none at all.

EFFECT ON THE CHILD

In 79 of the 80 cases of unprotracted labour there was no anxiety with regard to the child. The babies all cried at once and were normal in every respect. In the remaining case the child was born in white asphyxia but was resuscitated fairly easily. In 16 of the 20 cases in which labour was prolonged the babies gave rise to no anxiety. In 3 of the 20 cases the following notes were made:—

Case 51.—Child slightly blue. Easily and quickly recovered. Forceps delivery under full chloroform.

Case 55.—Child slightly blue. Quickly recovered. Chloroform for delivery.

Case 99.—White asphyxia. Fairly easily recovered. Forceps delivery under full chloroform.

In one case there was a stillborn baby. Throughout labour, pains were strong but progress slow. Nembutal grs. 7½ and chloral hydrate grs. 44 were given in 15 hours, starting 21 hours before the birth of the child. The first repeat dose was given 16 hours before delivery, but before that the foetal heart could not be heard. Extract from the post-mortem report: 'Cause of death—asphyxia'. It seems questionable, therefore, if the nembutal had any bearing on the stillbirth.

CONCLUSIONS

From this analysis of 100 cases it seems fair to conclude that nembutal, given in combination with

chloral, is of undoubted value in labour. (1) It seemed to be of most use in placid or fairly placid women whose pains were strong and distressing; (2) it was most effective when given between 3 and 5 hours before delivery; and (3) when the patients had not been admitted more than 8-12 hours, so that labour was well established before the women had to be kept completely in bed; (4) on the other hand, it was found to be of very doubtful value in nervous or hysterical patients, both from the lack of analgesia resulting and the extreme restlessness induced.

Nembutal grs. 3 in capsules given by the mouth and followed by chloral hydrate grs. 22 as a syrup, grs. 11 to the drachm, were found to be perfectly safe. In no case, with the repeat dose (nembutal grs. 1½ and chloral hydrate grs. 22) in three hours, was there any suggestion of overdosing; indeed most of the 21 cases classed as 'fair' would probably have been successful as regards analgesia if the drug had been pushed.

Without the general anæsthetic for delivery there would not have been such complete amnesia in the 'very good' cases. Most people, however, agree that the worst pain is felt not when the child is actually being born, but when the head is descending through the pelvis. Therefore a considerable amount of relief could be obtained in ordinary cases without chloroform.

These results would probably be better in domiciliary midwifery, where one nurse stays with the patient all the time and where quiet and freedom from disturbance can be ensured.

Some Common Eye Diseases in Adults

By A. H. LEVY, F.R.C.S.

(Abstracted from the *Medical Press and Circular*, 11th October, 1933, New Series, Vol. CXXXVI, p. 334)

Ingrowing eyelashes.—Apart from the gross cases, the result of trachoma or of the more severe forms of blepharitis, eyelashes may occasionally deviate in direction from the normal and, bending backwards, impinge upon the eyeball and give rise to irritation, chronic conjunctivitis, or even keratitis. Occasionally a hair may grow from the caruncle and give rise to similar irritation. It usually suffices to remove the offending eyelash with a forceps, the succeeding lash generally growing in the normal direction. If not, the follicle had better be destroyed by electrolysis. The negative needle is inserted into the follicle, and a current of 3 to 5 m.a. passed for about one to two minutes.

CONJUNCTIVITIS

The affections of the conjunctiva are the commonest forms of eye trouble, and can be exceedingly troublesome. They may be divided into two main categories: physico-chemical reactions, and infections. Foreign bodies may irritate the conjunctiva by their mere presence, or they may also contain chemical irritants, as, for instance, aniline dyes. A bit of the lead of an indelible pencil can cause extensive sloughing, if allowed to remain in for any length of time. Certain organic substances act in the same way, as, for instance, certain pollens in the production of hay fever.

The infections of the conjunctiva are many and various, but for practical purposes can be divided into the acute and chronic forms. The commonest form of acute conjunctivitis is that due to the pneumococcus, and has been described in a previous article. A less common form is that caused by the Koch-Weeks bacillus (a very small Gram-negative bacillus). This may occur in epidemic form, but as such is rare in this country. Treatment should be continued for a long time, and consists of cold lotion, such as oxy-cyanide of mercury, 1 in 8,000, with occasional applications of 2 per cent silver nitrate. Argylol drops, 10 per cent, are also very useful. To prevent the lids sticking together any indifferent ointment smeared on

the edges of the lids at night suffices, but if the condition becomes chronic then the insertion into the conjunctival sac of 1 per cent or 2 per cent yellow oxide of mercury is very helpful.

Chronic conjunctivitis can be subdivided into many forms, but the most frequent is caused by the Gram-negative diplobacillus of Morax-Axenfeld. Characteristic of this type is the redness of the lids, frequently both conjunctival and skin surfaces, and limited more or less to the canthi. Patients complain of itchiness, the feeling of sand in the eye, and stickiness of the lids in the morning. Zinc sulphate is specific for this form of conjunctivitis, used as an eye lotion of the strength of one grain to the ounce, or as drops of double that strength. It is to be remembered that this form of conjunctivitis is very prone to recur, and therefore the treatment must be prolonged at least six to eight weeks.

LACHRYMAL APPARATUS

An increased flow of tears can only be caused by two conditions, hypersecretion of the gland or interference with the outflow passages. Hypersecretion of the gland practically always means some irritation of the eyeball—from a foreign body on the cornea or under the upper lid to an inflammation of the cornea or internal structures of the globe. The cause must be found and treated, whereupon the watering of the eye will cease. Interference with the outflow may be caused by the impossibility of tears entering the passage, or by some mechanical hindrance in the canaliculi, the tear sac, or the naso-lachrymal duct.

Under the first heading there is primarily malposition, especially of the lower lid. An eversion which carries the punctum away from the globe, and which if allowed to persist will lead to a definite ectropion. This condition is seen in flaccid lids, especially in elderly people, facial paralysis, cicatricial contraction, etc. An occasional cause of obstruction to the outflow of tears is the impaction of a cilium in the lower punctum.

If there be no interference with tears entering the passage, the obstruction must be more deeply seated, and may be of many different kinds and in various situations. The localization of such obstruction can be gauged by pressure over the tear sac. If there be regurgitation through the canaliculi into the conjunctival sac, then the obstruction must be below the point of pressure. If there be no regurgitation, then the site of the obstruction must be proximal to the point of pressure, i.e., along the canaliculus or at the point of entrance of the canaliculus into the sac. There may be a stricture from an old ulceration in the duct, or as the result of some periostitis. Passing a medium-sized lachrymal probe after a preliminary dilatation of the punctum will show the point of obstruction, and by dilating any stricture cure or relieve the condition. If the sac has been the seat of prolonged inflammation, then pockets full of pus and diverticula will have formed, and more serious surgical procedures must be undertaken.

CORNEA

Foreign bodies.—In searching for foreign bodies it is essential to have good illumination, with the light falling obliquely on the cornea, and a loupe through which to examine the cornea. It is well to instil cocaine first so as to eliminate the watering and the photophobia. In searching for a foreign body the upper lid should always be everted, as frequently foreign bodies get lodged in this position.

Superficial and deep keratitis.—There are many forms, some of which have been described in a previous article. In adults the commoner forms of keratitis are those associated with injuries and infections of the cornea directly, or extensions of inflammatory processes from the surrounding conjunctiva, as in trachomatous ulcers and pannus. And there is also that form which is associated with nerve lesions, as in peripheral neuritis, herpes febrilis, herpes zoster ophthalmicus and surgical interference with the Gasserian ganglion.

A common form which merits special notice is the hypopyon ulcer. This is a superficial ulceration of the cornea in which the anterior chamber becomes partially filled with sterile pus, and which clears up when the ulcer heals. The best treatment is to scrape the base of the ulcer with a small sharp spoon, and then with a finely-pointed match-stick to apply pure carbolic acid to this surface, being careful to allow the acid to penetrate underneath the overhanging edge of the ulcer, frequent douching with a mildly antiseptic lotion, and using an occluding bandage.

Herpes zoster ophthalmicus is always to be regarded as a serious affection. As long as the eruption is limited to the distribution of the supra-orbital nerve the treatment will be the usual one, but in addition it will be well to keep a close watch on the eyeball, and to instil atropine once or twice daily to minimize the effect of any cyclitis which may appear, and which will be mentioned later. If, however, the cornea should become the seat of an herpetic ulcer, the condition immediately becomes very serious. At the best the healing process will leave a scar which will almost certainly impair vision, and at the worst the ulcer will lead to perforation of the cornea and possibly destruction of the eyeball. It is to be noted that the cornea is only involved in those cases in which the area supplied by the nasal branch of the ophthalmic division of the fifth nerve shows the herpetic vesicles. The reason for this is that the ciliary ganglion from which the eye derives its sensory fibres is itself supplied by twigs from the nasal nerve as it passes across the orbit. The nasal nerve supplies the mucous membrane of the nose and the area of skin comprising the tip and alæ of the nose. Hence when these parts are involved the eye must receive special attention. The treatment must be directed to protecting the cornea as much as possible. An occlusive bandage, warm bathing and atropine, 1 per cent, with possibly rest in bed.

Beyond the direct involvement of the eye in the herpetic process, a deep-seated cyclitis is frequently seen in all forms of herpes of the ophthalmic division of the fifth nerve. This is characterized by tenderness over the ciliary region, redness, and usually many precipitates on the posterior surface of the cornea. As a rule this is a very resistant form of cyclitis, and requires prolonged treatment.

In all herpetic affections of the eyeball it must be remembered that the sensibility of the cornea is considerably reduced, so that the normal protective mechanism functions badly. Foreign bodies may remain on the cornea and give rise to ulcers, and there occurs superficial keratitis of a more or less intractable or recurrent nature. In addition there are active destructive processes analogous to those seen on the cornea after removal of the Gasserian ganglion, or its injection with alcohol for trigeminal neuralgia. All these types of disorder are best treated by complete occlusion of the eyeball, even to the extent of sewing the lids together. To do this it is necessary to raise the edges of the lids, and to place the sutures so that they do not come into contact with the cornea.

SCLEROTIC

Scleral tissue is analogous to the tissue of tendons, and the inflammations affecting it are similar; characteristically in scleritis there is local thickening and hyperæmia. This thickening may go on to the formation of a definite swelling, which practically never softens or breaks down, and may last for weeks or months and finally disappear. Recurrences are frequent, but as long as the changes are limited to the superficial layers (episcleritis) no great harm is done. It is only when the major part or whole thickness is involved that there is left a localized thinning of the sclerotic which may lead to local ectasias. The treatment consists of hot fomentations, and the application of one of two per cent yellow oxide of mercury ointment.

The general health should receive attention, and any septic focus treated.

IRITIS AND IRIDO-CYCLITIS

The whole uveal tract, iris, ciliary body and choroid, is a vascular structure partaking of the nature of a serious synovial membrane, and is subject to inflammations of the same type. It is rare to get an inflammation of one part only, although certain types tend to involve one or other part more intensely than the rest. It is difficult in any given case to be certain of the exact cause, but the principal things to remember are chronic gonorrhœa, septic foci in the teeth, tonsils, etc., and, after that, tuberculosis and syphilis. The symptoms of the commoner forms of iritis are ciliary injection, pain, and the formation of synechiæ. The pain is due to the swelling and constant movement of the iris. The ciliary injection is a reddish-blue area just outside the corneal limbus, and is due to engorgement of the ciliary body. The synechiæ are the result of the plastic exudate from the inflamed iris which causes it to adhere to the anterior capsule of the lens. In the treatment atropine is the sheet anchor. It stops all iris movements and thus quickly relieves the pain, and it dilates the pupil so that its margin is no longer in contact with the lens capsule, and thus obviates the formation of synechiæ. Hot fomentations are a powerful adjuvant, and beyond this the treatment of the underlying cause must be undertaken.

GLAUCOMA

Any eye in which the intraocular tension is raised above the normal is termed glaucomatous. There are the primary cases in which the ætiology is obscure, and the secondary forms in which it is due to alteration in the nature or some interference with the normal outflow of the aqueous fluid. If the rise of tension be acute then there occurs pain, which may be exceedingly severe, congestion and dilatation of the pupil. If the rise be slow, then there will be no pain, but only a slowly progressive loss of field and, later, diminution of visual acuity. The treatment in the acute forms is operation; in the chronic forms miotics, such as eserine, or operation.

The more deeply seated inflammations of the ciliary body (cyclitis) and choroid are, generally speaking, due to the same causes as iritis, and the treatment should be along the same lines. In this connection it is necessary to mention keratitis punctata. This is a deposit of fine particles on the posterior surface of the cornea, and is symptomatic of cyclitis. The inflammatory exudate from the ciliary body is carried by the aqueous into the anterior chamber, and in the course of the ordinary circulation of the aqueous fluid comes into contact with the cornea and, being sticky, adheres to it. In all inflammations of the interior of the eye careful search should be made for these deposits, as their presence helps greatly in determining the seat of the inflammatory change.

Iritis is occasionally confused with glaucoma, acute or chronic. The differentiation of these two conditions is of fundamental importance, since the treatment of glaucoma with mydriatics will inevitably damage the eye, and the treatment of iritis with miotics will increase the pain and lead to the formation of dense synechiæ. The differentiation is all the more difficult inasmuch as the tension of the eye may be raised in iritis by the increase of the quantity of fluid in the eye and its albuminous nature. The main points are that in iritis the pupil tends to be contracted, while in glaucoma it tends to be dilated. The field of vision will be contracted in glaucoma particularly on the nasal side. The cornea in glaucoma tends to be hazy and the aqueous clear, while in iritis the cornea may be clear, but the aqueous will be muddy. In cases of doubt the instillation first of cocaine and later of homatropin will help to clear up the diagnosis.

Reviews

AN OUTLINE OF IMMUNITY.—By W. W. C. Topley, M.A., M.D., F.R.C.P., F.R.S. 1933. Edward Arnold and Company, London. Pp. vii plus 415. Price, 18s.

To those who share the opinion of the reviewer, that Topley and Wilson's *Principles of Bacteriology and Immunity* is the best book on the subject that has been written, the appearance of this new book on immunity will be noted with agreeable anticipation. The basis of the present volume is, of course, the sections on immunity in the earlier book, but there has been considerable re-arrangement, the sections have been re-written, much has been added, and—we are told in the preface—there have been a few omissions.

There is a great deal to be said against the disruption of medical science into a number of '-ologies', but there does not seem to be any alternative; we must accept the necessity for this division and make the best of it by the encouragement of good liaison work. Immunology was not particularly well mated to bacteriology, and it is certainly more closely associated with clinical medicine than is the latter; possibly therefore this divorce from bacteriology will lead to a closer association with clinical medicine.

The first meaning of the word 'immunity' was freedom from service; then it was applied in a legal sense to mean freedom from certain taxes; and finally, about fifty years ago, it was applied to the state of insusceptibility to certain infectious diseases, particularly when this was brought about by inoculation, under the misapprehension that this was absolute. This is precisely what immunity, as we understand it now, does not mean. Complete insusceptibility, as Professor Topley says, would do away with the relationship between host and parasite, and our interest in the matter would be finished; but as long as it is understood that the word means the total reaction produced by the association of the host and parasite, it will serve its purpose. A complete appreciation of this fact will carry a student a very long way towards an understanding of the whole subject, and far beyond the state of knowledge in which the earlier textbooks have left his predecessors.

An early chapter is headed 'The measurement of immunity and reaction in the living animal'. Although it fits very well in its place in the book, this chapter provides very suitable reading for the medical research worker. In the section on the assessment of significance the author has broken all the canons of writers on statistical subjects and has treated the problem in such a way that a reader of mediocre intelligence (e.g., the reviewer) can understand it.

One cannot say that the subject is dealt with systematically because it is impossible to say what should be the natural sequence, and, if one chapter does not lead on to the next, at least the order in which they have been placed is a logical one. Everything is there; that is to say, everything to do with immunity in bacterial and virus diseases; the subject of immunity in protozoal diseases has not been touched upon except in a very general way.

In a book of this nature it would be impossible to avoid controversial subjects, but the author discusses them without heat, even when expressing his opinion on Besredka's theories regarding local immunity, and without apparently displaying any marked prejudice; he naturally expresses his own opinion, which, in view of his reputation, must carry a great deal of weight.

It is hard to pick out any chapters for special mention, but one, the chapter on herd immunity and herd infection, cannot be passed over; the author displays a very characteristic attitude when he reviews the evidence for the assumption which nearly all epidemiologists make, that the virulence of an organism at

different stages of an epidemic varies; he concludes that none of it will bear close examination. Other popular assumptions are robbed of much of their dazzle after they have been filtered by his cold reasoning; for example, one does not feel nearly so confident that the preventive inoculation really reduced the pneumonia in the South African mines, after reading the section on this subject, as one did before.

Each chapter is concluded with a very valuable summary, and a number, but not an overwhelming number, of references.

One can safely say that this is the most important book of its kind that has been written for a number of years. The author claims that it is written for the young student, and admittedly it is written in such a way that he can understand it, but it is also a book for the post-graduate student, the teacher, and the research worker; to the last-named we can particularly recommend it.

L. E. N.

THE PRACTITIONERS' LIBRARY OF MEDICINE AND SURGERY. Volume IV. (Non-traumatic Surgery). 1933. D. Appleton and Company, New York and London. Pp. xlviii plus 1146. Illustrated. Obtainable from Messrs. Butterworth and Co. (India), Ltd., Calcutta. Price, Rs. 37-8 per volume

THIS is the fourth volume of that very ambitious, and so far very successful, encyclopædia, the *Practitioners' Library*. An original, but very satisfactory, division of the subject of surgery has been made; this volume is entitled 'Non-traumatic Surgery'. There is much to be said for this division; of course, many non-traumatic conditions are complicated by trauma, but allowance has been made for this and where primarily non-traumatic conditions are likely to be complicated by trauma the point is discussed; inversely, one assumes, in the volume on traumatic surgery, non-traumatic complications, which in this case are often more important than the primary injury, will be discussed. This overlapping cannot be used as an argument against this division of the subject, any more than could the frequent medical complication of a surgical case for this centuries-old division of medical science.

There are twenty-two chapters, with a few exceptions each contributed by a different writer. There is a short chapter on neoplasms, otherwise the division is regional, the breast, the neck, the thyroid gland, etc., or by 'systems', the urinary system, bones and joints, etc.

This volume is well illustrated throughout; many of the surgical procedures are shown step by step, and in a number of instances the diagnostic features of deformities and diseased conditions are so well demonstrated by photographs as to make the reading of the text almost unnecessary.

We have one criticism in connection with the illustrations. Why in taking a photograph for reproduction in a surgical book is it necessary to cover the genitalia of even young children and thereby detract very considerably from the value of the illustration? In one instance in this book a side view of a child with congenital double dislocation of the hip is entirely ruined by bits of material plastered all over the buttock.

The book is quite up to the high standard set by the earlier volumes in this series. It is a high-priced book, but it is very good value for the money. Messrs. Butterworth, the agents in India, have asked us to mention that the complete set may be obtained through them on the instalment system.

COMBINED TEXTBOOK OF OBSTETRICS AND GYNÆCOLOGY FOR STUDENTS AND MEDICAL PRACTITIONERS.—By J. M. Munro-Kerr, M.D., F.R.F.P. & S. (Glas.), F.C.O.G., J. H. Fergusson, M.D., LL.D., F.R.C.S. (Edin.), F.R.C.P. (Edin.), F.C.O.G., F.R.S. (Edin.), J. Young, D.S.O., M.D., F.R.C.S. (Edin.), F.C.O.G., and J. Hendry, M.B.E., M.A., B.Sc., M.B., F.R.F.P. & S. (Glas.), F.C.O.G. Second Edition. 1933. E. and S. Livingstone, Edinburgh. Pp. xii plus 1100, with 497 illustrations, and additional x-ray plates. Obtainable from Messrs. Butterworth and Co. (India), Ltd., Calcutta. Price, Rs. 26-4

THIS admirable book provides the student or medical practitioner with all that he need know of obstetrics and gynecology, in a volume of moderate size. It has been brought up to date and gives in admirably clear fashion all the latest additions to our knowledge of these subjects. The book is very well written throughout and is a model of clearness and compression. The illustrations are abundant and excellent.

The first 670 pages deal with obstetrics. Then there is a very interesting and educative chapter on puerperal mortality. The remaining 400 pages deal with gynecology. This section opens with a connecting chapter between obstetrics and gynecology. In this it is said that 'there is no greater opportunity for the exercise of preventive treatment in the whole realm of medicine that is afforded in midwifery practice'. The book ends with a short chapter on radiology in obstetrics and gynecology written by Dr. Duncan White. The obstetrical part contains an excellent chapter on the care of the newly-born infant, by Dr. Charles McNeil. This chapter deals with the first month of life much more fully than is usually done in manuals of midwifery, and it should prove of the greatest service to the doctor in charge of such infants. A particularly interesting chapter is that on the physiology of pregnancy where all the changes in the maternal organism are lucidly described. The author states that 'eclampsia is rare in warm climates' this they attribute both to the heat and largely vegetarian diet. That eclampsia is rare in warm climates is certainly not true, in Bengal or Madras where it is extremely common although the people are vegetarians. It is rare in the Punjab where the people are meat eaters. The deciding factor would appear to be neither temperature nor diet, but humidity.

J. M.

DISEASES OF INFANTS AND CHILDREN.—By J. P. C. Griffith, M.D., Ph.D., and A. G. Mitchell, M.D. 1933. W. B. Saunders and Company, Philadelphia and London. Pp. xvi plus 1155, with 280 illustrations. Price, 50s.

THE authors in attempting to produce a textbook which will appeal to the undergraduate and the pædiatric expert alike, have undertaken a task extremely difficult of successful accomplishment no matter how experienced the authors may be. The student looks for dogmatic teaching, while the expert looks for the latest theories and possible lines of research. Both are liable to be disappointed in the present volume. The student will find the innumerable references to names in the body of the text irksome, and the teaching not sufficiently dogmatic, while the pædiatrist will look in vain for any reference to the work of Dr. Helen Mackay on nutritional anæmias in children, or for an account of 'infantile liver' so frequently given as a cause of deaths in children in Calcutta.

The section dealing with the care and nutrition of the normal infant is comprehensive, though test-feeding, an important demonstration to doctor and parent alike of the adequacy or otherwise of the amount of milk ingested, is conspicuously absent and the proprietary foods mentioned being all of American manufacture are neither well known nor readily obtainable in India.

The major part of the book deals with disease; disease in the newborn, infectious disease, a section on

nutritional and miscellaneous disease which includes rheumatism, and sections dealing with disease in the various systems and special senses in turn. The balance is on the whole well preserved and the teaching up to date, though the compression inevitable in a one volume book has necessitated several minor, though important, omissions, as, for example, of the part played by the swimming bath in the spread of molluscum contagiosum. Under functional nervous disease the term 'eclampsia' is applied to convulsive attacks, resembling tetany, that occur in early life. The American spelling of 'edema' and 'fetus' is used throughout. Despite the sound teaching, the excellence of several of the illustrations, and the successful coloured plates, depicting vaccination, the Mantoux test and different stools in infants, the book has no outstanding quality which will cause it to replace in popularity any one of the excellent textbooks on the subject published by English authors.

J. M. O.

PEDIATRICS.—By Henry Dwight Chapin, M.A. & M.D., and Lawrence T. Royster, M.D. Seventh Edition. 1933. Baillière, Tindall and Cox, London. Pp. xvi plus 775, with 149 figures. Price, 35s.

FOURTH editions of this American book were entitled *Diseases of Infants and Children* but with this edition the name has been changed to *Pediatrics*. The authors define pediatrics as 'the study of normal growth and development both physical and mental, the phenomena of metabolism and nutrition which promote normality and the prevention of pathological states', while it also retains its original function of the study and treatment of disease in children. It will be seen, therefore, that the book covers a very wide field. The first section is devoted to growth and development, beginning with foetal development and antenatal influences; the next sections to the newly-born infant, the sick child and infant feeding. Dr. Royster recommends lactic acid whole milk as the best artificial food for infants. The various food and milk preparations described in this section are American brands and perhaps are not so well known or so easily obtainable in India as the corresponding European preparations. Tables of foods recommended for young children by the American Child Health Association are given. It is rather surprising to find bacon included in the breakfast menu from 12 months onwards. The remaining sections of the book deal with the diseases of childhood, including the exanthemata, commoner surgical diseases, and diseases of the eye, ear and skin. The scheme of the book is very ambitious and the effort to make one volume deal with so much has not been altogether successful. This is particularly so in the first section where the subject is dealt with in so general a manner as not to be of much practical use. However, the fact that the first edition appeared in 1909 and that this is the seventh denotes the general usefulness and soundness of this volume.

J. M.

A HANDBOOK OF PSYCHIATRY.—By J. H. Ewen, M.R.C.P. (Edin.), D.P.M. 1933. Baillière, Tindall and Cox, London. Pp. viii plus 267. Price, 12s. 6d.

THIS book will be found of great service to those for whom it is primarily intended, namely, medical students or medical practitioners desirous of obtaining a diploma in psychological medicine. In other words, it is an excellent cram book. The author is well advised to bring to the notice of his readers that our present knowledge of mental disorders precludes the presentation of an adequate classification of them. The author's chapter on the aetiology of mental disorder is excellent and repays careful study. The only outstanding defect, but one more or less inevitable in books of this description, is an excessive compression

voluminous textbooks on the subject has been condensed in it in such a way as to facilitate quick revision.

N. P.

ANATOMY, PART IV (ABDOMEN), CATECHISM SERIES.—By C. R. Whittaker, F.R.C.S.E., F.R.S.E. Fourth Edition (Revised and Enlarged). E. and S. Livingstone, Edinburgh. Pp. 84. Price, 1s. 6d.

This book of the Catechism Series deals with the abdomen in the form of questions and answers. The first 11 pages are devoted to the male and female perineum. The next 11 pages contain the description of the abdominal wall, the inguinal region being specially dealt with on account of its surgical importance. In the description of the subcutaneous inguinal ring the crura have been misplaced. In the subsequent pages the abdominal cavity with the contained viscera, vessels, and nerves have been described. The relations of the organs and important vessels have been nicely put in a tabulated form suitable for quick revision. Similarly the branches and tributaries of the vessels have been enumerated in tabulated form. The new nomenclature has been chiefly adopted throughout. This small book will be specially appreciated by students preparing for their examination in anatomy as it will facilitate quick revision of the subject and help in writing up answers in an appropriate and concise form.

N. P.

A TEXTBOOK OF BOTANY.—By James Small, D.Sc., Ph.C., F.L.S., F.R.S.E. Third Edition. 1933. J. and A. Churchill, London. Pp. x plus 717, with over 1,350 illustrations. Price, 21s.

This profusely illustrated and well-got-up volume will be useful to general, as well as to medical and

agricultural, students as a textbook. It has been written in an easy and readable style, and the numerous illustrations it contains will enable students to get an insight into the subject with ease and accuracy. The chapters on fruit and seed dispersal, germination, and pollination are dealt with in a very interesting and educative manner. In the section dealing with physiology, the most difficult subjects, such as those of osmosis, ecology, plant enzymes, heredity, carbon assimilation and protein synthesis, are treated in such a lucid and clear style as would only be expected from a very experienced teacher. The references at the end of each chapter will be useful to those who wish to go into further detail regarding these subjects. The appendices, in which the diagnostic characters of important medicinal plants and the life history of the special types of the lower vegetable kingdom are described, will be useful to students whereby to learn important points in connection with the description of the plants for purposes of identification, and for studying the life history of the lower organisms of the vegetable kingdom.

OTHER BOOKS RECEIVED

Secretion Interne et Regenerescence. By N. E. Ischlonsky.

Un Pericolo Sociale: Le Brucellosi. By Prof. A. Alessandrini—Dott. M. Pacelli.

Reports of the Committee upon the Physiology of Vision. XIII. Determination of the Sensitiveness of the Eye to Differences in the Saturation of Colours. Special Report Series, No. 188. By L. C. Martin, F. L. Warburton, and W. J. Morgan. (Medical Research Council.) Published by His Majesty's Stationery Office, London. Price, 1s.

Abstracts from Reports

ABSTRACTED FROM THE ANNUAL REPORT OF THE CHEMICAL EXAMINER TO THE GOVERNMENT OF MADRAS FOR THE YEAR 1932

ANALYTICAL NOTES

Madur.—A common and poisonous weed that grows all over India is madar (*Calotropis gigantea*) a plant with pink or white flowers and fat fleshy leaves which on crushing exude a sticky white juice. This juice is not uncommonly used both as a poison by the mouth and as an abortifacient introduced into the uterus on a small stick. In addition to the tests for it described in my report for 1931, we have found that an alcoholic extract of the juice saponified with caustic potash gave, on extraction with petroleum ether, a fairly abundant white crystalline substance freely soluble in ether and chloroform. This substance may also be extracted by evaporating off the alcohol from the saponified alcoholic solution and extracting with ordinary ether. It yields with sulphuric acid a crimson colour. Even in the presence of fats as in the case of visceral matters this substance can be easily extracted in cases of madar poisoning. Further work on this substance is held up at present owing to the pressure of routine work.

Oduvan leaves.—The acid ethereal extract from the leaves gives a green colour with strong hydrochloric acid, a purple colour with strong sulphuric acid and causes paralysis and death when injected under the skin of a frog. In the viscera, however, the green colour with hydrochloric acid often cannot be obtained though the reaction with sulphuric acid and the physiological action on frogs are obtained. A microscopic examination of the oduvan leaf shows the following

characteristics which might enable one to identify the leaf:—

(1) An upper epidermis of polygonal cells with no stomata.

(2) A single layer of palisade cells.

(3) A spongy mesophyll with large prismatic crystals of calcium oxalate in abundance along the course of the vessels on either side of them.

(4) A lower epidermis of wavy-walled cells with numerous stomata. The stomata are surrounded by two cells each of which is parallel to the osticle.

The root of this plant is also poisonous.

Oleander.—Yellow oleander is one of the most commonly used poisons in Madras. The red variety is much less frequently used. Both oleanders give acid ethereal extracts fatal to frogs and which produce a characteristic deep violet colour with strong sulphuric acid after the lapse of several hours. In the case of yellow oleander a green colour is obtained on boiling the fresh kernels with sulphuric acid, but in the case of viscera this colour is not obtained after digestion in the stomach. Dr. Rajagopal Nayudu has been investigating the poisonous constituents of oleander for some years as time can be found, and the following results are of interest:—

Dried yellow oleander kernels were pressed to squeeze out most of the oil, and the powdered cake was extracted in a Soxhlet, using a mixture of chloroform and ether, so adjusted that the extraction occurred in the presence of one volume of chloroform to two of ether in the Soxhlet. The ether chloroform extract was evaporated to dryness and washed with petroleum ether to remove the remaining oil. This was named *Extract A*. The kernels were next extracted with absolute alcohol. After evaporating a portion of the

alcohol from the alcoholic extract ether was added to it, when a white precipitate appeared in abundance. This was filtered, again dissolved in a small quantity of alcohol and re-precipitated by ether. The precipitate was dried. This was called *Extract B*.

Extract A was found to be nitrogen free and on combustion analysis gave 7.1 per cent hydrogen, 58.1 per cent carbon, and 34.5 per cent of oxygen by difference. Dragendorff's analysis of thevetin gave the following results:—hydrogen 7.53 per cent, carbon 58.06 per cent and oxygen 34.11. So this extract is probably thevetin. *Extract A* melts at 178°C. with decomposition. It is very soluble in chloroform and sparingly so in water and in ether. On boiling with hydrochloric acid this extract does not give a blue colour. It gives a cherry-red colour turning to violet with concentrated sulphuric acid. When a dilute solution is painted on a frog's heart, at first the contractions are stimulated, then irregularity follows with contractions of the auricle only for some time, the ventricle being in tonic contraction. Then the ventricle contracts a few times, and then the auricle alone continues. The rate diminishes and the heart stops in systole. Injected into the dorsal lymph sac of frogs it produces convulsions and death.

Extract B is freely soluble in water and in alcohol, but insoluble in ether and chloroform. On boiling with dilute hydrochloric acid it gives a deep blue colour. The aqueous solution has a tendency to froth on shaking. Even after purification the sample does not give a definite melting point as it appears to decompose at about 135°C. It is, however, very poisonous, 0.2 milligram killing with paralysis a frog weighing about half an ounce. A dilute solution painted on the exposed heart of a frog gives rise to tonic spasm of the ventricle, the auricle only working. Finally, the heart stops in systole. Ten milligrams injected hypodermically killed a cat weighing 22 ounces in 20 minutes. The symptoms noted were vomiting, paralysis, and asphyxial spasms prior to death. An examination of the toxicity of *Extract B* on animals gave a curious result. With white rats it was comparatively non-toxic. Doses up to 67 milligrams per kilogram of body weight (10 milligrams for a 150 gram rat) produced no symptoms at all. On guinea-pigs on the other hand a much smaller dose was fatal—the minimum lethal dose being about 10 milligrams per kilo. of body weight. The symptoms in guinea-pigs were, (1) profuse diuresis, (2) convulsions, (3) paralysis, and (4) death, appearing in this order. With sublethal doses only the first one, two or three of these symptoms occurred and recovery began after one or two hours and was complete by the next day. It is hoped to continue the investigations on this extract when the rush of routine work permits.

CASES OF INTEREST

Eucalyptus oil.—There were two cases of suspected eucalyptus oil poisoning. In one of these cases a ticket collector and a girl with whom he was living drank about an ounce each of eucalyptus oil. They had vomitings and purgings. The stationmaster getting alarmed at their symptoms removed them to the local hospital. The purgings and vomitings were sent to this laboratory for analysis, and eucalyptus oil was detected in them. At the trial the accused stated that they drank the oil with a view to frightening others, and not to committing suicide. The medical officer who treated the cases testified that eucalyptus oil was not included in the list of poisons and was not ordinarily likely to cause death of the two persons even if they had not been treated. On this evidence the magistrate acquitted the accused. I am not sure that the doctor was quite correct in his opinion that eucalyptus oil is non-poisonous, though his opinion is the generally accepted one. In several cases in England a fairly small quantity has produced serious narcotic symptoms and I am inclined to consider that the comparative harmlessness of the eucalyptus oil as ordinarily bought

in the hazaar is due to its heavy adulteration with other oil—probably groundnut oil.

Aconitine.—There was a curious case of aconite poisoning in which a woman, at the instigation of her paramour, is alleged to have administered a potion to her husband, believing that it would have the effect of rendering him complaisant to her irregularities of conduct. The potion was given in clintney, but it is stated that the husband noticed a bitter taste in the clintney and threw it to the fowls. The taste of aconite is not markedly bitter and one would have thought in clintney its taste would have been completely masked till enough had been eaten to cause death. In this case five fowls are said to have eaten the discarded clintney and all of them to have died. The viscera of the fowls were sent to us and we found aconite in them. At the trial owing to many discrepancies in the prosecution evidence the accused was discharged.

Betel.—Cases of poisoning by chewing pan supari are reported from time to time though these are not generally fatal. The substance chewed consists of betel leaves wrapped round areca-nut and slaked lime. Which of the three constituents is the occasionally poisonous one is not certain. In a case sent here during the year under report a man aged about 30 after chewing a roll of betel leaves began to sweat profusely and suffered from vomiting and diarrhoea. In this case he did not recover, but his symptoms rapidly got worse and he went into convulsions, became unconscious and died within an hour. As usual in such cases we did not detect any poison in the viscera. Mr. T. R. Subrahmanya Ayyar, the Second Assistant Chemical Examiner, is investigating the alkaloids of areca-nut with a view to discovering which of them may give rise to these symptoms.

ABSTRACT FROM THE MUNICIPALITY OF SINGAPORE, HEALTH DEPARTMENT. ANNUAL REPORT FOR 1932

DR. HUNTER's reports are always interesting. They are always reasonably up to date, and not too long; he goes straight to the interesting matter and makes his points clear. In the present report, the first thing that is brought to our notice is the low death rate; 20.31 per 1,000 compared with 25.20 in 1931 and 27.73 in 1930. The peninsula of Malay, of which Singapore is the chief town, has during the last two years been more badly hit by economic depression than possibly any other country. The two staple industries, rubber and tin, have very nearly disappeared temporarily. Crowds of coolies and labourers have been paid off. Singapore of course has suffered greatly by these happenings and, moreover, the lame and the halt and destitute have drifted, as they always do in depressed times, to the metropolis.

Dr. Hunter reviews the situation. In the first place he comments on the complete absence of cholera, plague and smallpox (save for 8 cases) in Singapore during the year. He does not explain this extraordinary fact. He deals next with the criticism that his death rate is low as it is based on too high a population. It will be remembered that last year he discovered that 19,500 children had been missed in the census, and he added these to his population figure. The census officer naturally repudiates this assertion and states, according to Dr. Hunter, that the children were not missed but were carried forward into subsequent age groups. Dr. Hunter is not satisfied with this argument and still thinks that the children were missed at the census. Then there is an argument that the lower number of deaths is due to a smaller population, owing to wholesale emigration by Chinese and their families. One would have thought that there would have been more or less precise information on this point, but apparently there is not. From market and other returns, Dr. Hunter finds no evidence of diminished food supplies such as would have been expected, by a big

reduction of the Chinese population, and though the better class houses are less tenanted, there is gross over-crowding in the poor districts. So Dr. Hunter sticks to his guns and his low death rate (justifiably we think). He states that Singapore by its situation, its climate and its amenities *should* have a low death rate, and that in this year, 1932, Singapore was almost free from the usual influx of sick and destitute (this having exhausted itself in 1930 and 1931 owing to the shutting down of labour in the country to skeleton crews only). In 1932 therefore the city was free to show its real comparatively low death rate. Analysing the low death rate still further, Dr. Hunter asks the question whether the lowered death rate is simply due to the above fact, or to any real improvement in the sanitary and other conditions in the city during the year. The saving of life, compared with 1931, occurs in a varied group of diseases, headed by respiratory diseases and infantile convulsions followed by beriberi, which shows 180 fewer deaths than in 1931. The reduction in infantile convulsions led to a record low infantile mortality rate of 180.2 and Dr. Hunter pays a special tribute to the Maternity and Child Welfare work which is organized and run on sound and energetic lines and which he states is now undoubtedly exercising a very distinct effect on the reduction of infant mortality. It is still a high figure and an interesting investigation was and is being still carried out to find out some of the definite causes of the high figure.

Congenital syphilis and inanition due to maternal syphilis appears to be an unsuspected cause of many infant deaths and strenuous efforts are to be made to tackle this difficult question. The confidence of mothers is rapidly being gained and the welfare work amongst mothers and children is now on a very good footing and is yielding very definite results in saving of mother and child life and in improving the conditions and methods of life.

Dr. Hunter suggests another reason for the drop in the death rate—one put forward by Dr. Heiser who states that he has noticed that when chlorination of a large water supply has been instituted (whether the water previously was of a high bacteriological quality or not), there has followed subsequently a drop in the general death rates. Chlorination of the Singapore water supply has been instituted within the last year or two and Dr. Hunter wonders whether the phenomenon described by Dr. Heiser has anything to do with the lowered death rate. He does not commit himself but thinks the situation may be investigated further from this point of view.

Dr. Hunter's work on malaria is well known and his conclusion is that barring a few 'ludlowi' breeding areas in the low-lying parts of the town, Singapore is practically free from anophelines. The 'ludlowi' question is still with them—the reclaiming of a large 'ludlowi' breeding ground, the Kallang Basin, has been temporarily shelved on account of financial stringency. *A. ludlowi* is a funny insect however—at the present time its malaria-carrying propensities in Singapore seem to be in abeyance. Only an occasional case of malaria was reported from the districts in which it breeds and at no time were there any signs of an epidemic. Its present activities in Bengal are in distinct contrast to its behaviour in Singapore. Dr. Hunter's view is that in outbreaks of malaria associated with this mosquito the phenomenon seems in some way to be associated with some change in or disturbance of its breeding ground. This was the view taken by some when consideration of the 'ludlowi's' activities near Calcutta was commenced, but investigations did not seem to yield much information in this direction.

The report contains interesting reports of the work of the municipal laboratories and other departments. The examination of sludge from the Imhoff tanks shows that living hookworm larvae can be isolated from the

sludge after 88 days' life in the latrine; and the development into infective sheathed larvae could be followed from day to day. Hirst in Colombo found that ground in which septic tank sludge was buried was infective for at least 3 years. In Singapore the sludge was treated to 135°F. for 40 minutes to kill hookworm larvae; it was found however that round-worm eggs still continued to develop and the sludge is now raised to a temperature of 150°F. for 40 minutes.

ABSTRACT OF THE ADMINISTRATION REPORT OF THE DIRECTOR OF MEDICAL AND SANITARY SERVICES, CEYLON, 1932

THIS is a very comprehensive report of the activities of the Medical and Sanitary Services. The salient points are a little difficult to extract. Malaria seems a universal problem in the island, and plague seems to have established itself to some degree. Hirst's work on the entrance of plague into Colombo and its spread by exportation of *X. cheopis* to other parts of the island is well known. In 1932 there was more plague in Colombo than in any other seaport in the world. When plague appears powers are taken under a special ordinance to declare certain streets and buildings as 'diseased localities'. People and goods are prevented from getting in and out of such a locality. Evacuation of the people is then carried out and a rat-flea campaign instituted. The goods are then evacuated. Guinea-pigs are finally used as tests for absence or presence of fleas.

There was no cholera in the island during the year. About 800 deaths from enteric were registered, but many more were suspected. The birth rate was 37 and death rate 20.5 per 1,000; the infantile mortality 162. Yaws is endemic and over 23,000 cases were treated. The number is steadily decreasing annually. Treatment for yaws is given throughout the island by 'Itinerating Medical Officers' of whom there are now four.

Antimalarial measures are on the usual lines. The antihookworm campaign continues. A special dispenser for the work is known as 'Anky'. Mass treatment is carried out by health units. The numbers of treated are given, but the opinion is expressed that after so many years of campaign work, the results are not very encouraging. Only one-fifth of the population is receiving treatment and the other four-fifths continue the work of dissemination. An account is given of the large amount of work done in Government hospitals and dispensaries. The report bears testimony to good organization, administration and executive work over very wide fields.

ABSTRACT OF THE MUNICIPAL AND SANITARY REPORT ON HONG KONG, 1932. BY DR. A. R. WELLINGTON, DIRECTOR OF MEDICAL AND SANITARY SERVICES

IN our notice of this Annual Report for 1931 we commented on the peculiar sanitary and medical administration in the Island of Hong Kong which not only *must* make work difficult, but renders advance in certain directions almost impossible.

The Legislative Council itself performs the duties of a Municipal Council and the colonial heads of departments perform the duties which in a municipality would be performed by municipal heads of departments. Perhaps this is not surprising considering the fact that Hong Kong really consists of two towns—Victoria and Kowloon—the rest of the island being negligible and hardly inhabited.

The Director of Medical and Sanitary Services is the official adviser on all medical and sanitary matters. The sanitary department is distinct and independent of the director and has at its head a layman of the cadet service. It has attached to it, medical officers of health seconded from the medical department.

The present machinery for the promotion of the public health is complex. Organization of energy both for the cure and prevention of disease is divided among

a number of units which operate more or less independently of each other. Proposals have been submitted for the reorganization of the medical and sanitary services by which these anomalies will be remedied. Progress in this seems to be slow.

Sanitary conditions in the towns of Victoria and Kowloon are determined largely by their geographical features. Victoria is built on a narrow belt of shore land on the north side of the island. There is practically no room for expansion, and high narrow houses which are densely populated are a feature of the working class areas. There are in this part 1,000 persons per acre. Year by year the population has increased, immigration being accelerated by unrest in China. Houses and rooms have been divided and subdivided into permanent cubicles, with little or no room for kitchens, and latrine accommodation is often limited to pail closets on the roofs of buildings.

Tuberculosis is naturally widespread and in 1932 provided a death rate of 252 per 1,000. This is much below the real figure, as those afflicted with the disease and unable to work and earn a living go back to the Chinese mainland to die in their own villages. The problem is a difficult one and the housing problem seems almost insoluble. The town of Kowloon has been built more recently and has been laid out on definite lines. It is rapidly growing and will soon rival Victoria in population. Hong Kong suffered from cholera in the pandemic of cholera in China but, as the report says, the small epidemic in Hong Kong resulting in 241 deaths, might have been much more severe. There was also an epidemic of smallpox, with 212 deaths. Chinese custom does not allow of vaccination till the propitious time of the second birthday. Hence there is a very large number of unprotected infants. For the last 3 years there has been no case of plague. The disease has disappeared from Hong Kong and the same may be said of South China. The rat population is much the same as it was and, so far as is known, there is no change in the quantity or quality in the flea population. As the report says, in spite of the continuous campaign against rats, owing to the rapidity with which they multiply and the ease with which they enter and leave the colony, there still is and probably always will be a sufficiency of rats and

rat fleas in the colony to light up and maintain an epidemic 'if the Gods so will it'. We trust the 1894 story will not be repeated.

There was a sharp outbreak of cerebro-spinal fever. It would appear that the meningococcus has taken on a decided virulence in the East and Far East during the last 2 or 3 years. (In 1932 and 1933 there have been distinctly severe, though localized, outbreaks in India, in places as far apart as Calcutta and Lahore.)

Enteric fever, as one would expect, is fairly common though the spread seems to be mainly from cases and to some extent from carriers, but is never milk- or water-borne.

The department of health and medicine has many activities, and school hygiene and maternity and child welfare are good going concerns. There are many excellent hospitals, government and non-official. Voluntary effort is playing a large part in the education of the Chinese manners in health and social work, and hopeful progress is being made.

The Government bacteriological institute bemoans its isolated position and the overloading with routine work, which prevents several of the colony's problems receiving the attention they should.

Nevertheless, some interesting work has been done. In the epidemic of cerebro-spinal meningitis, the isolated organisms have been typed, and examinations of the total protein present in the cerebro-spinal fluid carried out by McNaught's method.

Type III was most numerous—71 per cent, type I coming next—22 per cent, 22 per cent being indefinite, and 4.4 per cent inagglutinable by any of the type sera.

Malaria seems fairly common, *Anopheles minimus* and *jeyporiensis* being the carriers. They breed in collections of seepage water near the hill side. A great deal has been done to free the town of malaria by large drainage schemes.

The analysts department reports a great deal of interesting chemico-legal and other examinations. Scarcely of poisoning of wells revealed a bit of carbolic soap and some clay and starch as the offending agents. There is still no Food and Drugs Act in the Colony.

We look forward to the next annual report principally to see what progress will be made in the sanitary administration of the Colony.

Correspondence

THE THERAPEUTICS OF MALARIA

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR,—With reference to the recently-published report of the Health Organization of the League of Nations regarding the therapeutics of malaria, it would appear that this disease must react differently to treatment in various parts of the world.

I agree that the 'cinchona febrifuge' now obtainable is practically valueless, but can see no object in trying to devise a new cinchona preparation, when quinine is far more efficacious, and should be much cheaper in the near future, as large stocks are available, and its sale will decrease in proportion, as the sale of new synthetic drugs increases. In my opinion, prophylaxis, by the administration of any of the anti-malarial drugs, is of little value: the only prophylaxis of any use is that of destroying the infecting mosquito and curing those who are affected by the disease.

None of the poor and very few of the rich, even leaving aside the expense, are going to take for days or weeks on end, (1) quinine, which is very bitter, and makes the ears buzz, (2) plasmoquin, which may cause cyanosis, abdominal pain, sweating, or cardiac symptoms, or (3) atabrin, which may cause yellowness of the skin.

As regards treatment of the actual attack, my findings in this part of India differ from those given in the report and after trying various methods I have found the following to be the most efficient:—

As soon as malaria is diagnosed, quinine, in large doses—for an adult, 30 grains a day by mouth, or by injection, the latter in cases of vomiting, hyperpyrexia or coma. As soon as the fever is controlled, atabrin 0.1 gramme, t.d.s., for 5 days, combined with plasmoquin 0.01 gramme in cases of malignant tertian infection only.

It always seems to me cruelty to the patient to withhold quinine, until the temperature drops, as his agony thereby may be prolonged for days. By the treatment mentioned above I find that the fever is quickly controlled, and that relapses are infrequent.

Yours, etc.,

P. A. DARGAN,

MAJOR, I.M.S.,

Civil Surgeon, Dera Ghazi Khan.

DERA GHIAZI KHAN,
12th December, 1933.

[Note.—It has now become a well-recognized fact, and one, of which the Malaria Commission took full

account, that malaria reacts differently to treatment in various parts of the world; it is also true that, in the same part of the world, malaria caused by different species of plasmodium and malaria caused by the same species of plasmodium, but occurring in different individuals, react diversely to treatment.

Our correspondent agrees—but it is not clear with whom—that the “cinchona febrifuge” now obtainable is practically valueless. One of the points made by the report under discussion is that the expression ‘cinchona febrifuge’ has become meaningless; it has been applied to any mixture of the alkaloids. If therefore he means that valueless cinchona febrifuge is obtainable he is certainly right, but if he means that only valueless cinchona febrifuge is obtainable he is, with equal certainty, wrong.

It may be logically assumed that, from a medical point of view, the best devisable cinchona alkaloid preparation must be at least as good as quinine, but the more important point of view, as our correspondent appears to recognize, is the economic one. We do not however share his optimism regarding the fall of the price of quinine. Where a monopoly is concerned—and the Kinabureau does virtually control the world price of quinine—the law of supply and demand does not always operate, and the fact that there are large stocks does not mean that the price of quinine must inevitably fall. We hope, but so far it is little more than a hope, that the introduction of the synthetic anti-malarial compounds will cause a fall in the price of quinine. At present there is a heavy import duty on atabrin whereas quinine is free; this fact will not help to encourage the use of the former nor help to bring down the price of quinine.

The Commission were not dogmatic in their advocacy of any particular treatment routine, but in formulating their suggestions they took into account carefully-controlled treatment experiments that had been carried out in different parts of the world, and particularly those in India. Against such authority the impressions of individuals cannot carry much weight. The course of treatment advocated by Major Dargan seems to be a rational one, and it is one that is frequently advocated, but until very extensive, carefully-controlled, comparative experiments have been carried out it cannot be acclaimed as the best course.

Finally, we find it hard to believe that, in these days, anybody seriously advocates the withholding of treatment until the temperature falls as a routine measure; this meaning cannot be read into the recommendation of the Commission to delay specific treatment in certain circumstance.—EDITOR, I. M. G.]

A CALCULUS IN THE TONSIL

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR,—In the issue of the *Indian Medical Gazette* of September 1933, Dr. S. C. Sarkar described a case of pea-sized concretion in the tonsil under the heading ‘A Calculus in the Tonsil’. He asserted that he could find no previous record of a stone in the tonsil.

I beg to draw your readers’ attention to the *Indian Medical Gazette* of April 1931, page 199, wherein Dr. M. R. Shah reported the case of a tonsillar calculus weighing 80 grains. I believe this is a record. I have this stone in my possession. I am now sending it to the Medical School Museum, Ahmedabad, for inspection of those interested.

Yours, etc.,

N. B. MAJUMDAR, L.M. & S.,
F.C.P.S. (Bom.), B.M.S.

CIVIL HOSPITAL,

KAIRA,

5th December, 1933.

[Note.—We do not, of course, accept responsibility for the statements of our contributors, but in this instance in publishing Dr. Sarkar’s note without comment we must plead guilty to having overlooked Dr. Shah’s paper.—EDITOR, I. M. G.]

EARLY SIGNS OF ARSENICAL POISONING

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR,—S, a Hindu, male, aged 38, consulted me for dark pigmented spots on the palms. Syphilis was suspected, and the Wassermann gave a positive reaction.

Anti-syphilitic treatment was commenced with 0.3 gramine of neosalvarsan, for the first injection. Ten minutes after the fifth injection (0.45 gramme of neosalvarsan) there was a thin discharge of serous fluid from the palms, something akin to beads of perspiration. This trivial incident was attributed to the drug being old stock, and the dose was repeated next week, but the same reaction was observed in an aggravated degree. The discharge ceased in less than half an hour, and the pigmented spots have disappeared after these five injections.

Is this a case of commencing arsenical dermatitis? Is it advisable to continue to give arsenic?

Yours, etc.,

P. N. VAIDYANATHA IYER, L.M. & S.

TRICHUR,

CENTRAL STATE,

SOUTH INDIA,

21st November, 1933.

[This letter was referred to Lieut.-Col. R. N. Chopra, C.I.E., I.M.S., Professor of Pharmacology, Calcutta School of Tropical Medicine, who reports as follows:—

‘In arsenical dermatitis, the flexor surfaces of the trunk and limbs, including the palms, are affected. The local reaction occurring with each injection seems therefore to be a toxic manifestation of arsenic. The special predilection in this case may be the result of individual susceptibility and of local condition present. The use of arsenic, therefore, needs caution’.—EDITOR, I. M. G.]

TEBETREN

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR,—In your October number we notice an article by Lieut.-Col. R. N. Chopra and co-workers on the action of some synthetic anti-malarial remedies.

In this article the authors refer to ‘tabetren’; the correct name of this product is ‘tebetren’.

I shall be obliged if you will kindly draw attention to the error in your next issue and state that the product is manufactured by Messrs. Howards & Sons, Ltd., for the Proprietors Messrs. Chemopharm Ltd., 58, Victoria Street, London, S. W. 1.

Yours, etc.,

CHEMOPHARM LIMITED.

CALCUTTA,

31st December, 1933.

PLANOCAINE IN SPINAL ANALGESIA

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR,—I read with great interest Drs. Robinson and Seshachalan’s article on planocaine in spinal analgesia, in the *Indian Medical Gazette* of September 1933. In connection with this I am sending you the following extract from the *British Medical Journal* of 18th November, 1933, wherein planocaine is recommended only for short and minor operations.—

‘The opening meeting of the Section of Anaesthetics of the Royal Society of Medicine was held on 3rd November, when Dr. H. P. Fairlie delivered his presidential address on “Anaesthesia in Gynaecology”.

The president began by stating his reasons for having modified his views on the employment of chloroform in this type of work. He found he was using it less on account of its immediate and delayed risk. Gynaecological operations he divided into two classes—the minor and the major. For both classes he advocated the giving of morphine and nembutal orally as a

pre-medication. For the minor operations he contrasted the relative advantages of ethylene and oxygen, planocaine given as a spinal anaesthetic, and sodium evipan administered intravenously. The latter drug he found rather uncertain in its action, but suitable for short operations. For the major operations he favoured ether with oxygen, or spinal anaesthesia with percaïne'.

I should be very much interested to know Drs. Robinson and Seshachalam's views in the matter, as well as their experience regarding the administration of percaïne in preference to planocaine as advocated in the above extract.

One of the complications mentioned in planocaine administered is 'acute dilation of the stomach', from

which I infer that planocaine intra-spinal analgesia should be very strongly contra-indicated in stomach and intestinal surgery, even in hernia operations which the authors of the article under reference did not lay stress on.

Yours, etc.,

S. B. SURTI, F.R.C.S. (Ire.), D.P.H.,
Nizam's Medical Service.

CIVIL HOSPITAL,
NAMIPALLY,
HYDERABAD, DECCAN,
10th December, 1933.

Service Notes

APPOINTMENTS AND TRANSFERS

MAJOR-GENERAL C. A. SPRAWSON, C.I.E., V.H.S., Officiating Director-General, Indian Medical Service, is confirmed in his appointment, with effect from the 15th November, 1933.

In supersession of previous notification Major-General H. R. Nutt, V.H.S., is confirmed in the appointment of Surgeon-General with the Government of Bombay, with effect from the 19th July, 1933.

Colonel D. P. Goil, Inspector-General of Civil Hospitals, Punjab, is appointed Surgeon-General with the Government of Bengal, with effect from the 1st December, 1933.

Colonel A. W. M. Harvey is appointed Honorary Surgeon to the King, 16th October, 1933, *vice* Brevet-Colonel J. McPherson, C.I.E., who has relinquished the appointment on retirement.

Colonel Sir Frank Connor, Kt., D.S.O., V.H.S., Assistant Director of Medical Services, Bombay District, is appointed Surgeon-General with the Government of Madras, with effect from the 20th November, 1933.

Lieutenant-Colonel R. Knowles, on return from leave *ex*-India, is re-appointed as Professor of Protozoology, School of Tropical Medicine, Calcutta.

Lieutenant-Colonel R. Knowles, Professor of Protozoology, School of Tropical Medicine, Calcutta, is appointed to act in addition to his own duties as Director of the said institution, *vice* Lieutenant-Colonel H. W. Acton, C.I.E., on leave.

Lieutenant-Colonel C. H. Reinhold, M.C., Civil Surgeon, Lucknow, is appointed to be Inspector-General of Civil Hospitals, Punjab, with effect from the date on which he assumes charge of his duties.

Lieutenant-Colonel A. J. H. Russell, C.B.E., Deputy Director-General, Indian Medical Service, is appointed as Public Health Commissioner with the Government of India, with effect from the 11th December, 1933, *vice* Major-General J. D. Graham, C.B., C.I.E., K.H.S., granted leave preparatory to retirement from that date.

Lieutenant-Colonel N. S. Sodhi, M.C., Civil Surgeon, Lahore, is appointed to officiate as Inspector-General of Civil Hospitals, Punjab, in addition to his own duties, with effect from the 24th November, 1933, until further orders.

Lieutenant-Colonel G. G. Jolly, C.I.E., is appointed as Deputy Director-General, Indian Medical Service, with effect from the 11th December, 1933, *vice* Lieutenant-Colonel A. J. H. Russell, C.B.E., appointed as Public Health Commissioner with the Government of India.

Major R. M. Kharegat, an Agency Surgeon, on return from leave, is posted as Agency Surgeon, Bundelkhand, with effect from the afternoon of the 15th November, 1933.

Major R. Hay, an Agency Surgeon, is posted as Civil Surgeon, Quetta, with effect from the afternoon of the 22nd November, 1933.

LEAVE

Lieutenant-Colonel J. C. De, Professor of Clinical Medicine, Medical College, Calcutta, is granted combined leave for 1 year from the 1st March, 1934, or date of availing.

Lieutenant-Colonel D. D. Kamat is granted, with effect from 1st March, 1934, leave, out of India, preparatory to retirement, on average pay for 7 months and 21 days, followed by such leave on half average pay as will bring the total period of absence to 28th February, 1935, inclusive.

In modification of previous notification, Lieutenant-Colonel V. N. Whitmore, O.B.E., Civil Surgeon, Simla West, was granted leave on average pay, with effect from the 17th November, 1933, to the 28th February, 1934. His services are placed at the disposal of the Government of the Punjab, with effect from the 1st March, 1934.

Major H. Williamson, O.B.E., an Agency Surgeon, is granted leave on average pay for 8 months combined with study leave for 3 months and 21 days and leave on half average pay for 6 months and 10 days, with effect from the afternoon of the 22nd November, 1933.

PROMOTIONS

Lieutenant-Colonel (temporary Major-General) Sir Leonard Rogers, K.C.S.I., C.I.E., retired, relinquishes the temporary rank of Major-General on ceasing to be employed and is granted the honorary rank of Major-General, 14th November, 1933.

Colonel Sir R. McCarrison, Kt., C.I.E., K.H.P., to be Major-General, 20th July, 1933.

Captain to be Major

T. A. Doran. Dated 27th November, 1933.

RETIREMENT

Lieutenant-Colonel F. B. Shettle, O.B.E., retires 25th November, 1933.

Notes

SPIRIT-PROOF CONTAINER FOR HYPODERMIC SYRINGE

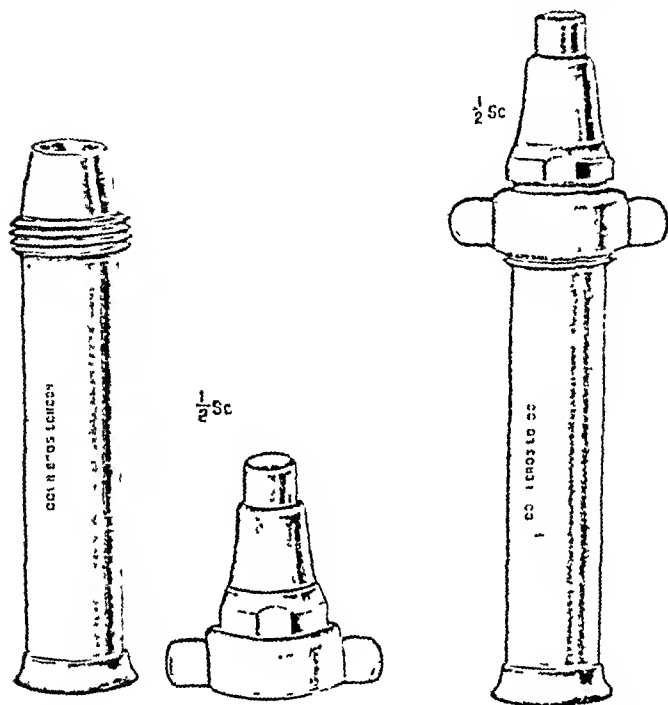
By H. M. STANLEY TURNER, M.D., D.T.M. & H.,
F.R.S. (Edin.)

THERE must be quite a considerable number of medical men, especially those working in the tropics, who have been constrained to anathemize the usual type of spirit-proof containers for hypodermic syringes at some time or other.

To get over this difficulty I have designed a holder, which has been made for me by Messrs. Down Bros.

and has stood up to an extremely severe test. The cap fits on to the container by means of a long taper and is held in position by a detachable butterfly union nut. This mode of construction permits of the cap being accurately ground-in, so that an absolutely spirit-proof joint can be obtained. It is not necessary to screw the union nut down tightly, as it merely has to hold the cap, which as has been mentioned is completely spirit-proof, in position. A mere flick is sufficient.

I tested the holder by putting in 30 c.cm. of a saturated alcoholic solution of methylene blue and inverting it in a water bath at 75°C. (3.4° below the boiling point of alcohol) for six hours. At the end of that period there was no visible coloration of the water either to the naked eye or when compared with a specimen of the water, taken from the bath before the start of the test, in a Klett colorimeter. When cooled and measured the contents of the container measured



30 c.cm. To avoid all risk of the cone sticking, the act of unscrewing the union nut effects a 'primary extraction' by separating the male and female halves. The union nut beds into a layer of white metal on the cap and does away with the need for washers.

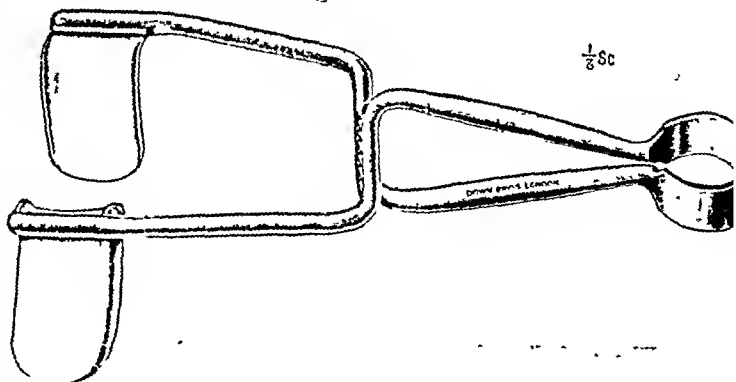
BAYER PRODUCTS

THE attention of our readers is drawn to the fact that the Havero Trading Company, the agents in India for the well-known firm of drug manufacturers, Bayer-Meister Lucius, have transferred their head office from Calcutta to Bombay; all correspondence should therefore be addressed to Havero Trading Co., Ltd., Commerce House, Ballard Estate, Bombay, or P. O. Box 642, Bombay.

SELF-RETAINING ABDOMINAL RETRACTOR

THE self-retaining abdominal retractor shown in the accompanying illustration gives wide and powerful retraction of the abdominal wall. The special advantages claimed for it are: (1) Simplicity of design: it does not require to be taken to pieces like some otherwise excellent retractors in order to go into the ordinary nursing-home sterilizer, with subsequent waste of the surgeon's time in re-assembling the parts. (2) Ease of manipulation: the blades are separated by compressing the handle with the *right hand only*, and the ratch is easily released when desired by gentle pressure with the right index finger on the under shank. This leaves the left hand free to manipulate the abdominal wall. (3) Smoothness of outline: it is entirely

free from projecting angles, knobs and thumb-screws which may entangle ligatures.



The retractor is useful for gynaecological operations and abdomino-perineal excision of the rectum. A special and unexpected use for the retractor is in performing a cholecystectomy through a paramedian incision. Lord Moynihan has pointed out that the placing of the left hand of the assistant 'in the exact position necessary to secure gentle traction of all the viscera away from the common duct is in many respects the most important single detail of the operation'.

Assistants are apt to remove that hand at the critical moment of the operation, when admittedly it is useful elsewhere. After the hollow viscera have been drawn to the left and covered with a moist gauze pack, the insertion of this self-retaining retractor will keep them out of the way as long as required and greatly facilitate the exposure of the common duct.

It is made in stainless steel by Messrs. Down Bros. Ltd., London, S. E. 1.

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Original Articles

FURTHER CLINICAL OBSERVATIONS ON POST-KALA-AZAR DERMAL LEISHMANIASIS

By L. EVERARD NAPIER, M.R.C.S., D.R.C.P.

and

C. R. DAS GUPTA, M.B., B.T.M.

Calcutta School of Tropical Medicine

We do not feel that any excuse is necessary for reporting our three years' further experience with this extremely interesting skin condition, post-kala-azar dermal leishmaniasis. Both writers are now engaged on other subjects, so that, as far as they are concerned, this paper will constitute a final clinical report.

From 1922, when the condition was first described, until the end of 1925 only odd cases cropped up, but from about November 1925 to the present date a steadily increasing stream of patients with these lesions have come to the School of Tropical Medicine for diagnosis and treatment. A series of 44 cases was reported by Acton and Napier (1927), and a second series of 150 cases by the present writers (1930); the latter series included patients that had attended up to the end of February 1930; the present series covers a period of three years from April 1930 up to the end of March 1933. During this period 209 patients with these skin lesions attended the kala-azar out-patient department; this probably does not include all the cases diagnosed in the School as there would be a certain number first seen in the skin or leprosy departments who, because they did not require treatment or for some other reasons, did not attend the kala-azar department. In nine of these 209 cases the records are inadequate and are not included in the following analysis.

The three reports will thus cover 394 cases, but they do not include the writers' whole experience of this condition, as cases have been seen both in Calcutta during periods not covered by these reports, at the village treatment centres (Napier, 1931) referred to here, in Assam (Napier and Smith, 1934) and in Madras (Napier and Krishnan, 1933); their total experience will amount to more than 500 cases.

Clinical types

The main types recognized are the same as described in our previous paper, and for detailed definitions reference should be made to it. The lesions were classified under the following headings:—

- Depigmented areas.
- Erythema or butterfly rashes
- Nodules.
- Verrucose types.
- Papillomatous types.
- Hypertrophic types.
- Xanthoma types.

The first three are the common types, in this series as in the previous ones; however, in the present series a greater proportion showed the depigmented lesions only, the erythema was noted more frequently and was also observed on parts of the body other than the face, and there were four cases with mucous-membrane lesions; these, with other abnormal cases, will be referred to later. In table I the cases are classified in groups according to the nature of the lesions.

TABLE I

Type of lesions

	NUMBER OF CASES IN WHICH LEISHMANIA		Total
	was found	was not found	
Mixed lesions (nodules plus other lesions)	55	61	116
Nodules only	10	3	13
Depigmentation and erythema	1	10	11
Depigmentation only	2	58	60
TOTAL ..	68	132	200

Nine photographs and one drawing of patients showing various types of lesions are here produced: Figures 1 and 2 are patients with extensive nodular lesions on the face; in the second the whole skin surface of the body was involved; both these patients had been diagnosed clinically as leprosy. Figure 3 shows a patient who has been under treatment on and off for many years; he has now got most extensive depigmented lesions on the body; the edges tend to be slightly raised and the small nodules are distributed over the depigmented areas. This is far from being a typical case.

Unusual clinical types

In this series we encountered all the clinical types mentioned above, with the exception of the 'xanthoma' type; there were in addition a few other types of lesions not hitherto described.

Mucous-membrane lesions.—In four cases they were definitely mucous-membrane lesions; the details of one are given briefly below:—

B M., Hindu male, aged 20, gave no history of kala-azar, but had 'typhoid' five years ago. His attention was drawn to his present condition one and a half years ago when he noticed a soreness of the roof of his mouth whilst eating; the condition has developed since this date.

Present condition.—He has a cauliflower-like growth on his hard palate, the centre of which is ulcerated; he has a butterfly erythema fairly well marked, and a few depigmented spots on his face, neck, chest, back and upper arms.

A snipping taken from the growth on the palate showed the presence of very large numbers of leishmania; they were far more numerous than is usual in a smear from a nodule (see figure 4).

The three other patients had raised nodular areas on the mucous-membrane surfaces of the



Fig. 1.

lips and cheek (figure 5); they were not ulcerated; smears from snippings showed leishmania in each case. In all these cases there were extensive nodular and depigmented lesions on various parts of the body.

Small ulcerated lesions.—One patient, an Anglo-Indian girl, aged 10, had a small ulcerated lesion on her nose. She gave a history of kala-azar two years before. She had depigmented lesions on other parts of her body. Leishmania were found in a smear made from material taken from the edge of the ulcer. She had never been out of Bengal, where *Leishmania tropica* infection does not occur. The lesion was not a typical oriental sore, but would have been accepted as one had it occurred in an endemic locality. The history and the presence of typical lesions in other parts of the body led to the diagnosis of post-kala-azar dermal leishmaniasis as against oriental sore.

The ulcer healed up slowly with antiseptic dressings and intravenous injections of neostibosan. It seems probable that this was a case

of some chronic bacteriological infection being superimposed on an area of skin infected with leishmania, and that the coexistence of the two infections was accidental. The incident is however exceptional, as there is usually rapid healing after the removal of a nodule for examination, and, as these snippings are taken under out-patient conditions, it is almost certain that the wounds are not always kept entirely aseptic.

Extensive erythema.—In two cases the erythema extended to other parts of the body; in one case the whole body was involved, and in the other only the lower limbs. Nodules were present in both cases, but not depigmented areas. Leishmania were demonstrated in both cases. The duration of the condition was long in both cases; in one it was given as 10 years; in this case there was no history of kala-azar, but only of fever with splenic enlargement.

Peri-onychial induration.—There was a suggestion of this in a number of cases, but in one

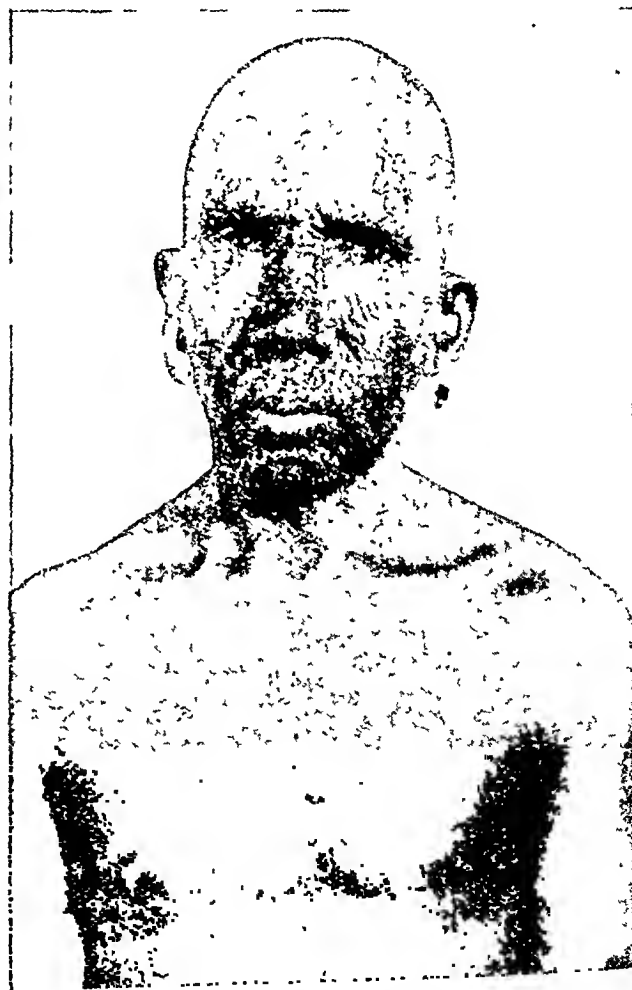


Fig. 2.

case it was definitely marked and leishmania were found in a smear from the lesion. Figure 6 demonstrates this condition which is not very different from the verrucose type already described, but in the latter there were definite warty growths rather than general peri-onychial thickening.

Associated conditions.—There were a few conditions which were almost certainly of



Fig. 3.

leishmanial origin as they were associated with other recognized leishmanial lesions; these were :—

Ichthyotic condition of the skin:—This was marked in two cases; in one the hands were involved (figure 7), in the other the feet.

Peeling of the skin:—In one case the whole of the skin of the soles peeled off.

Linear depigmentation:—In one case there were curious lines running vertically across the patella; the nature of the depigmentation was the same as that of the ordinary depigmented area, but was arranged in thin lines.

ANATOMICAL DISTRIBUTION OF THE LESIONS

This was much the same as in the previous series; an analysis of this distribution is given in table II.

HISTORY

History of prior attack of kala-azar.—In this series 82.5 per cent of cases gave a history of a previous attack of kala-azar; details are given in table III.

Incubation period.—In this series the time between the last symptoms of kala-azar and the appearance of the dermal lesions appears to be longer than in the previous series; the mean period was 1.88 years in the last series and is 2.32 years in this.

The mean duration of the depigmented lesions was 2.3 years, whereas that of the nodular lesions was 2.8 years. The difference in this series between the two groups is not so great as in the previous series; it indicates that time is not the only factor influencing the nature of the lesions. Details are given in tables IV and IVa.

Relationship to treatment.—Here a significant change has taken place in the distribution of the cases. In the last series in 47 per cent of the cases the treatment had been sodium antimony tartrate only, but in the present series this has dropped to 26 per cent; this, we assume, is nothing more than an indication of the increasing popularity of the pentavalent compounds in the treatment of kala-azar. It has at one time been said that the dermal lesions only occurred when insufficient treatment was given; there was no indication of this in the



Fig. 4

former series, nor is there any in the present one. Details are given in table V.

TABLE II
Anatomical distribution of lesions

	LEISHMANIA FOUND			LEISHMANIA NOT FOUND			TOTAL			Total
	Nod.	Flush.	Depig.	Nod.	Flush.	Depig.	Nod.	Flush.	Depig.	
Forehead	22	9	16	22	13	38	44	22	54	120
Nose	53	13	6	54	24	31	117	37	37	191
Lips	21	11	9	17	23	37	38	34	46	118
Ears	6	1	0	5	0	0	11	1	0	12
Cheek	34	14	18	28	29	77	62	43	95	200
Chin	51	14	11	40	26	77	91	40	88	219
Shoulder	1	0	30	0	0	53	1	0	83	81
Chest	5	0	37	0	0	85	5	0	122	127
Back	5	0	43	1	0	95	6	0	138	144
Avillary folds ..	6	0	29	0	0	68	6	0	97	103
Arm	6	0	41	0	0	101	6	0	145	151
Forearm	6	0	41	0	0	99	6	0	140	146
Hand	5	0	11	0	0	26	5	0	37	42
Abdomen	1	0	23	0	0	43	1	0	66	67
Thigh	3	1	33	1	0	84	4	1	117	122
Leg	4	1	23	0	0	58	4	1	81	86
Foot	7	1	5	0	0	16	7	1	21	29

TABLE III
History of kala-azar

	Cases in which leishmania was found	Cases in which leishmania was not found
History of kala-azar ..	1	8
History of kala-azar and treatment thereof ..	51	105
History of a febrile attack with enlargement of spleen.	8	11
History of fever without any definite enlargement of spleen	5	4
No history of any febrile attack.	3	4
TOTAL ..	68	132
Percentage giving no history of kala-azar.	23.5	14.4

CLASS DISTRIBUTION

Caste and sex.—The proportion of males affected is a little higher in this series than in the last; the percentage, 86 per cent, is also higher than the percentage of males amongst our kala-azar cases. This possibly indicates that Indian men are more particular about their personal appearance than are women in Bengal. This is not so in the case of Europeans and Anglo-Indians; here the figures for the two sexes are about equal. Details are given in table VI.



Fig 5.

Age distribution.—This is given in table VII. Two facts are again clearly brought out in this table, namely, that if all types of lesions are grouped together the largest number are in the

TABLE IV
Incubation period

Period that elapsed between conclusion of treatment for kala-azar and first signs of dermal conditions	THOSE SHOWING DEPIGMENTED LESIONS ONLY			MIXED LESIONS			All cases
	L.D. +	L.D. —	Total	L.D. +	L.D. —	Total	
Less than one year	1	9	10	12	10	22	32
One year but less than two years ..	1	21	22	16	10	26	38
Two years " " " three " ..	0	15	15	11	8	19	34
Three " " " " four " ..	0	4	4	0	10	10	14
Four " " " " five " ..	0	7	7	5	5	10	17
Five " " " " six " ..	0	3	3	1	2	3	6
Seven " " " " eight " ..	0	2	2	1	0	1	3
Nine " " " " ten " ..	0	0	0	1	0	1	1
TOTAL ..	2	61	63	47	45	92	145

TABLE IVa
Duration of lesions

	DEPIGMENTED LESIONS			MIXED LESIONS		
	L.D. +	L.D. —	Total	L.D. +	L.D. —	Total
Less than one year	1	19	20	11	18	29
One year but less than two years ..	..	14	14	14	0	23
Two years " " " three " ..	1	14	15	11	18	29
Three " " " " four " ..	..	12	12	10	9	19
Four " " " " five " ..	..	4	4	5	6	11
Five " " " " six " ..	1	4	5	2	2	4
Six " " " " seven " ..	..	1	1	7	..	7
Seven " " " " eight " ..	..	..	..	1	..	1
Eight " " " " nine " ..	..	..	..	..	1	1
Nine " " " " ten " ..	..	..	..	2	..	2
Ten years or more .. ..	..	..	..	2	..	2
TOTAL ..	3	68	71	65	63	128

TABLE V
Nature of treatment for original infection

	Cases with only depigmented lesions	MIXED LESIONS			All cases.
		L.D. +	L.D. —	Total	
Sodium antimony tartrate	19	12	7	19	38
Urea stibamine or other pentavalent compound	24	29	35	64	88
Mixed treatment	5	3	1	4	9
TOTAL ..	48	44	43	87	135
(Treated at the School of Tropical Medicine)					
Sodium antimony tartrate	2	1	0	1	3
Urea stibamine or other pentavalent compound	0	0	2	2	2
Neostibosan	7	..	2	2	9*
TOTAL ..	9	1	4	5	14

*Neostibosan has been the routine treatment in the School for some years, so that, naturally, this group will be the largest.

TABLE VI
Community and sex distribution

	Depigmented only	MIXED			All cases
		L. D. +	L. D. —	Total	
Hindu male	28	45	33	78	106
Hindu female	5	0	2	2	7
Mohammedan male	19	15	19	34	53
Mohammedan female	6	2	2	4	10
European or Anglo-Indian male	2	1	3	4	6
European or Anglo-Indian female	5	1	1	2	7
Indian Christian male	4	0	3	3	7
Indian Christian female	3	0	0	0	3
Other caste (Jew) female	0	1	0	1	1
MALE	53	61	58	119	172
FEMALE	19	4	5	9	28

third decennial age-group, whereas in kala-azar the largest number are in the second decennial age-group, and that in the case of those showing depigmented lesions only the peak of the age curve is in the second decennial age-group, whereas in those showing mixed lesions it is in the third.

The first fact is either the natural consequence of dermal lesions being delayed sequelæ of the generalized infection, or due to the greater susceptibility of older patients to the development of noticeable dermal lesions. The second indicates either that the depigmented lesions tend to appear earlier, or that they tend to take this form in younger patients.

DIAGNOSIS

In this series the number of cases diagnosed by finding the parasite was relatively less than in the previous series. The reason for this is that we have found that with experience it is possible to make a diagnosis clinically with absolute certainty. (It might be mentioned in justification for this statement that we have no natural leaning towards *clinical* diagnosis; on the contrary we always teach that it is *never* justifiable to make an unsupported clinical diagnosis of kala-azar.) In some cases no microscopic examination was made; in the majority a single smear from a nodule removed by means of a pair of sharp scissors was examined, and only in cases where there was any doubt about the diagnosis was a more thorough investigation—including cultural methods and sandfly feeding (*vide infra*)—undertaken.

The diagnosis in the cases with unusual lesions has in the first instance nearly always been determined by the presence of concomitant typical lesions; for example, the erythema would usually escape notice if there were not depigmented lesions also present, and it is

usually the latter that are first noticed by the patient. Nowadays, however, we are on the lookout for the characteristic erythema and we have recently encountered two cases in



Fig. 6.

which there were no other lesions present; in one of these, parasites were found by making smears from a small snip of skin, but in the

other we failed to demonstrate the parasite. In the second case the condition was thus possibly not due to leishmania, and an open diagnosis was made; neither case is included in this series. In all the cases in this series in

to 1932 was exactly 2,500 kala-azar cases; of these 29 or 1.16 per cent attended again with dermal leishmaniasis. Many patients developing dermal lesions will not have noticed them, others will have noticed them but not considered

TABLE VII
Age distribution

Age group	NODULAR OR MIXED LESIONS						DEPIGMENTED LESIONS ONLY		TOTAL		GENERAL KALA-AZAR ATTENDANCE
	LEISHMANIA FOUND		LEISHMANIA NOT FOUND		TOTAL						
	No.	%	No.	%	No.	%	No.	%	No.	%	%
Less than 10 years	4	6.15	0	14.28	4	2.7	7	9.8	11	5.5	21.1
10, but less than 20	11	16.92	9	46.0	20	15.6	29	40.8	49	24.6	41.1
20, " " " 30	31	47.7	29	30.15	60	46.8	20	28.2	80	40.3	..
30, " " " 40	13	20.0	19	6.35	32	25.0	12	16.9	44	22.1	10.0
40, " " " 50	4	6.15	4	3.17	8	6.2	1	1.4	9	4.52	5.2
50, " " " 60	2	3.07	2	..	4	3.1	2	2.8	6	3.0	
	65	..	63	..	128	..	71	..	199	..	..
Age not recorded in 1 case											

which unusual lesions are reported, the parasites were found in these lesions themselves and not merely in the associated lesions.

We have in a few instances used sandflies as aids to diagnosis. The sandflies (*Phlebotomus argentipes*) are allowed to feed on the lesions, at intervals of 48 hours or so, they are fed again on an uninfected experimental animal on one or more occasions, and finally they are dissected and examined for leishmania. In one case, reported elsewhere (Napier, Smith, Das Gupta and Mukerji, 1933), the lesions were so undeveloped that they had not been noticed by the patient herself, and were overlooked by a number of medical men who examined her, yet a sandfly became infected with leishmania after feeding on her arm.

THE INCIDENCE OF DERMAL LEISHMANIASIS

The fact that the writers have now seen at least 500 cases of a disease that 10 years ago was considered an extremely rare condition indicates that the incidence is increasing. The attendance of cases year by year does not indicate any recent marked increase in the numbers, but there is as yet little sign of any decrease, whereas the kala-azar incidence wave has shown signs of declining for the last 10 years; the possible epidemiological significance of this has been discussed elsewhere (Napier and Krishnan, 1931).

The attendance at the kala-azar out-patient department at the School during the years 1927



Fig. 7.

them of sufficient importance to necessitate treatment, and yet others will have sought treatment elsewhere. The majority of our

patients are not permanent residents of Calcutta, and many come from distant parts of Bengal. It is therefore safe to conclude that the 29 patients who attended for diagnosis and treatment for dermal leishmaniasis are only a small fraction of the total number that developed these lesions.

In a village treatment centre near Calcutta where we had been treating kala-azar patients for some years, we collected 120 ex-patients, and examined them for dermal lesions; we found that six of these had definite dermal lesions; only one patient had noticed the lesions himself and drawn our attention to them.

These two sets of observations are in accord with one another; taking the incidence of dermal leishmaniasis as five per cent of treated kala-azar patients, we can readily believe that

lesions, and in five cases there was kala-azar in the family prior to the patients' attack of kala-azar. It is not possible to draw conclusions from these few figures, but they do appear to indicate that dermal lesions may be a source of infection to other members of the family.

Treatment.—There is not very much new to be said about treatment. It is not very satisfactory. Patients must always be prepared to undergo a much longer course of injections than they received for the original disease. Twenty injections, given twice or thrice weekly, must be looked upon as the minimum course. In some instances the nodular lesions will steadily shrink and the depigmented lesions will slowly assume the normal colour of the skin. The latter is always a slow process, and even in an early case it will be three or four months before it is completed.



Fig. 8.

Group of treated and cured kala-azar patients amongst which the six cases of dermal leishmaniasis, shown in figure 9, were found

only about a quarter of these would find their way back to us for treatment.

It will be seen from the two photographs that, though the population was a mixed one, all the patients developing dermal lesions were children (figures 8 and 9).

FAMILY HISTORY

In 23 instances there was a family history of kala-azar. The fact was noted in the routine examination of these patients, but only during the last year or so have more detailed enquiries been made regarding the time relationship of the patients' attacks with those of the other members of the family. It was ascertained that in five instances kala-azar occurred in the family after the appearance of the dermal lesions in the patient, in five there was kala-azar in the family at the time the lesions were first noticed, in two cases the kala-azar in the family occurred between the patients' kala-azar attack and the onset of the dermal



Fig. 9.

We have used neostibosan, aminostiburea, or urea stibamine in the majority of cases with some degree of success—we have a personal preference for the first-named; but we have found in some cases that resist treatment with the pentavalent compounds that trivalent antimonials, such as foudadin, give good results. In obstinate cases we have combined the antimony treatment with large doses of potassium iodide, with thyroid extract, with para-thyroid extract and with adrenalin. We have also used berberine sulphate locally, and leishmania vaccines. We have not had consistently good results with any one of these subsidiary forms of treatment, but our experience has been that even the most obstinate case will eventually clear up. By this time, however, the patient has usually received such a diversity of treatments that it has been impossible to say which brought about the cure. Thus, it has been impossible to make any scientific appraisal of the value of any of these subsidiary forms of treatment.

RELAPSES

A number of patients who have received insufficient treatment have come back later with their lesions in much the same condition as they were when they first attended, or perhaps showing slight signs of advancing, but few have shown definite relapses after being cured. The patient shown in figure 10 was an exception. He originally attended for diagnosis only; at that time he had a few nodular lesions on the face and a few depigmented areas on other parts of the body. He was given advice regarding treatment, he returned to his home where he was given a number of injections of neostibosan, and he considered himself practically cured; he then discontinued treatment but after a few months the present lesions appeared and developed rapidly. They were not the typical nodules, but red and vesicle-like, though of course they contained no free fluid. Histologically these nodules were the same as the typical ones, except that the covering epidermis was very thin.

DISCUSSION

During our last three years' experience of this condition no observations have been made that would lead us to make any serious alteration in our previously-formed opinions. That we should find new forms of this disease, we did not doubt, and it is equally certain that as time goes on yet others will be found. We have held the view that the depigmented and erythematous were the early lesions and that from them the nodules develop. This is frequently the history given by the patients themselves, and in the first series of cases analysed (Acton and Napier, 1927) this was clearly

indicated by the shorter histories in the cases showing depigmented lesions only; however, a reference back to tables IV and IVa will show that in this series there is less support for this view, as in many cases the depigmented lesions did not appear for three, four, and five years after the kala-azar attack and did not develop into nodules even after five years. It would appear that the age of the patient and the anatomical site are far more important factors in determining the nature of the lesions, though there is no doubt that in a certain number of cases the lesions do pass through the various stages of development that we indicated in our earlier papers.



Fig. 10.

The observations of a few cases in which there were lesions in the sub-mucous connective tissue does not in any way alter our conception of the disease; nor does the fact that in two cases, one a skin and the other a mucous-membrane lesion, ulceration occurred alter our definition of the condition as a non-ulcerating one, or in any way bring this condition into line with either oriental sore or the muco-cutaneous leishmaniasis of South America. In the case of the lesion on the palate, it is probable that the mucous membrane which was stretched over the nodule was repeatedly damaged by food in the mouth, and eventually broke down.

(Continued at foot of next page)

TREATMENT OF CHRONIC INTESTINAL AMOEBIASIS WITH GAVANO, A DERIVATIVE OF IPECACUANHA

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ONE of the most difficult problems with which a medical practitioner in the tropics has to deal is the treatment of chronic intestinal amoebiasis. Amoebic dysentery is very common in India. A routine examination of the stools of patients admitted into the Carmichael Hospital for Tropical Diseases showed an incidence of 12 per cent of infection with *Entamoeba histolytica*. Chronic intestinal amoebiasis as a cause of sickness and invaliding in this country is of great importance, especially among the European community. An acute attack of amoebic dysentery can, in the majority of cases, be successfully relieved by proper treatment, but eradication of chronic intestinal infection with *E. histolytica* is a difficult matter. Most of the remedies used reduce the infection to a low level so that the patient's own powers of resistance can keep in check the parasites which still remain in the body. Emetine although it is an excellent drug for the treatment of amoebic dysentery often fails to cure the chronic carrier condition. It has been said that emetine cures about one-third of the cases, one-third improve, and in the remaining third the drug has no effect at all. When actual symptoms of

dysentery are present, the amoebæ are numerous and in full activity, yet they are amenable to the action of emetine. The reason is that the gut in that condition is hyperæmic and any emetine circulating in the blood will have ready access to the amoebæ. The most resistant are the chronic cases that get relapse after relapse and fail to react to this drug. In these patients there is superficial ulceration or even considerable thickening and fibrosis. The amoebæ are said to be walled in and it becomes difficult for emetine to act on them. Why entamoebæ can be readily eradicated from one individual and become firmly established in another is difficult to say. The influence of the environment on the vegetative forms of *E. histolytica* is believed to be an important factor in the encystation. It is possible that these factors also play a part in the carrier problem and also prevent emetine from producing its usual destructive effect. The position of emetine with regard to chronic amoebic dysentery can be summed up as follows:—

(a) Emetine is a toxic drug and it is not possible to give it in sufficient amounts and over sufficiently prolonged periods to destroy all the parasites. The encysted forms appear to be especially resistant to it, but it gives symptomatic relief in the majority of cases. (b) Emetine cannot be brought by colonic irrigation into contact with amoebæ deeply seated in ulcers. (c) The presence of secondary bacterial infection is an important factor in preventing cure. When amoebic and bacillary dysentery, especially of the Flexner type, coexist, the reaction of the gut becomes very acid and emetine cannot efficiently act in an acid medium. (d) In bacillary dysentery (Shiga type) the reaction of the gut may be alkaline to litmus (pH 8.11), in the amoebic form the pH of the stools is 6.3. It is found that when the pH of the contents is 7.0 the amoebæ are dead or dying; cyst formation occurs when the pH of the contents is 7.24; Charcot-Leyden crystals are passed at 6.96. The acid reaction hinders the action of emetine which works better in an alkaline medium. Attempts at markedly raising the alkalinity of the contents of the large intestine by giving alkalis by the mouth have not met with much success. Injections of emetine probably fail on account of the alkaloid not being in sufficient concentrations to be effective in the acid contents of the large gut. The stool in such cases are usually at pH of 6 or less and this means that emetine would have to be in a concentration of 1 in 10,000 or thereabouts to be effective on the amoebæ in this substrate. Efforts were therefore made to prepare compounds which could be given by the mouth so that higher concentrations could be obtained in the intestines. Emetine bismuth iodide was the first of these compounds. Although a distinct advantage is gained by giving emetine in this form, experience has showed that this compound is toxic and cannot be given in large enough doses.

(Continued from previous page)

Acknowledgments

Our thanks are due to Dr. K. C. Halder and to the other workers in the kala-azar department for their practical assistance, and to the officers in the skin and leprosy departments for referring many of their cases to us.

REFERENCES

- Acton, H. W., and Napier, L. E. (1927). Post-Kala-azar Dermal Leishmaniasis. *Indian Journ. Med. Res.*, XV, 97.
- Napier, L. E. (1931). Epidemiological Investigation of Kala-azar in a Rural Area in Bengal. *Indian Journ. Med. Res.*, XIX, 295.
- Napier, L. E., and Das Gupta, C. R. (1930). A Clinical Study of Post-Kala-azar Dermal Leishmaniasis. *Indian Med. Gaz.*, LXV, 249.
- Napier, L. E., and Krishnan, K. V. (1931). A Theory of the Ætiology and Epidemiology of Kala-azar. *Indian Med. Gaz.*, LXVI, 603.
- Napier, L. E., and Krishnan, K. V. (1933). Kala-azar in Madras and its bearing on Epidemiology of the Disease in India. *Indian Journ. Med. Res.*, XXI, 155.
- Napier, L. E., and Smith, R. O. A. (1934). Dermal Leishmaniasis in Assam. *Indian Journ. Med. Res.*, XXI, 557.
- Napier, L. E., Smith, R. O. A., Das Gupta, C. R., and Mukerji, S. (1933). The Infection of *Phlebotomus argentipes* from Dermal Leishmaniasis. *Indian Journ. Med. Res.*, XXI, 173.

One course often fails to affect a cure and a second and more intense course, of longer duration, has to be given. Even then a large residue of cases is left in which infection is not eradicated.

Another derivative of ipecacuanha was emetine adsorbate or 'Alkresta ipecac' which is an adsorption compound of the total alkaloids of ipecacuanha with hydrated aluminium silicate or fuller's earth. The advantage claimed for this compound was that it had no irritant effect on the gastric mucosa and therefore larger quantities of emetine could be introduced by the mouth and a higher concentration obtained. The drug is certainly well tolerated by patients, and its administration is not followed by diarrhoea and vomiting, as is the case with emetine bismuth iodide, but it is not effective in eradicating the entamoebæ.

Recently another derivative of ipecacuanha has been prepared by Messrs. Bayer-Meister Lucius under the name of *Gavano*. It is apparently a derivative of emetine (mono-methyl ester of cephaeline) or cephaeline itself. It is said to be a combination with an organic acid, the nature of which is not disclosed. The idea

of this preparation probably is to do away with the irritant and toxic effects of emetine so that the drug may be administered by the mouth in fairly large doses. With a view to testing its efficacy we tried this drug in a series of cases in the Carmichael Hospital for Tropical Diseases. The patients were all admitted under the senior author and most of them were chronic sufferers. The drug was given, as recommended by the makers, in doses of one tablet thrice daily for six consecutive days or one tablet twice daily for nine consecutive days. No restrictions were observed regarding diet but the bowels were kept open. The pulse rate was carefully recorded and the urine was examined daily while the treatment was going on and also for some days after the treatment was discontinued. Some of the patients had a mixed infection with bacillary dysentery and, in these, autogenous vaccines were given along with treatment by *Gavano*. The criterion of cure applied was six negative examinations after the cessation of treatment, this being the only one possible under the circumstances. The following table gives briefly the results we obtained:—

Table of cases treated with *Gavano* (a derivative of ipecacuanha)

No.	Race, sex, age	Duration and previous treatment	Laboratory findings before treatment	Treatment	Laboratory findings after treatment	REMARKS
1	I. Ch., F., 28	2 years ..	Scanty <i>E. h.</i> veg. and cyst, blastocystis, <i>E. coli</i> cyst, streptococci, <i>Salmonella morgani</i> , hookworm, ascari and trichuris ova.	I. <i>Gavano</i> 1 tab., b.d., for 9 days. II. Autovaccine (<i>Sal. morgani</i>) one course.	Negative 6 exams.	Cured.
2	A.-I., M., 10	5 months ..	Scanty <i>E. h.</i> cyst, giardia cyst, C.-L. crystals, blastocystis, streptococci.	I. <i>Gavano</i> ½ tab., b.d., for 9 days.	<i>E. h.</i> cyst.	Failed.
3	A.-I., F., 27	No intestinal symptoms. Pain in back, fever and unhealthy skin 6 years.	Very scanty <i>E. h.</i> cyst, hookworm, ascari and trichuris ova.	<i>Gavano</i> 1 tab., b.d., for 9 days.	Negative 6 exams.	Cured.
4	A.-I., F., 59	Present attack 5 days; gall-stones 2 years ago; diabetes 1 year ago.	Scanty <i>E. h.</i> veg. and cyst, blastocystis, <i>Salmonella morgani</i> .	I. Do. II. Autovaccine (<i>Sal. morgani</i>) one course.	Very scanty <i>E. h.</i> veg.	Failed.
5	M., M., 30	Originally admitted for malaria. No dysentery symptoms.	Scanty <i>E. h.</i> veg., <i>E. nana</i> cyst, blastocystis.	I. <i>Gavano</i> 1 tab., b.d., for 9 days.	<i>E. h.</i> veg., blastocystis.	Do.
6	H., M., 20	Do.	<i>E. h.</i> veg., C.-L. crystals, cellular exudate, hookworm ova.	<i>Gavano</i> 1 tab., b.d., for 9 days.	Negative 6 exams.	Cured.
7	M., M., 40	8 years ..	Scanty <i>E. h.</i> veg. and cyst, trichomonas, hookworm and trichuris ova.	Do.	<i>E. h.</i> veg.	Failed.
8	H., M., 45	2 months; treated for chronic bacillary dysentery some time ago.	Scanty <i>E. h.</i> veg., <i>E. coli</i> cyst, <i>I. butschlii</i> cyst, <i>E. nana</i> cyst.	<i>Gavano</i> 1 tab., t.d.s., for 6 days.	Negative 6 exams.	Cured.

Table of cases treated with Gavano (a derivative of ipecacuanha)—concl'd.

No.	Race, sex, age	Duration and previous treatment	Laboratory findings before treatment	Treatment	Laboratory findings after treatment	REMARKS
9	H., M., 27	8 months; emetine with temporary relief.	Scanty <i>E. h.</i> veg., trichomonas, streptococci, epithelial cell, degenerated polymorph and few r.b.c.'s. Urine: a trace of albumin, bile.	Gavano 1 tab., t.d.s. for 6 days.	<i>E. h.</i> veg.	Failed.
10	M., M., 20	Originally admitted as a case of kala-azar.	<i>E. h.</i> veg. and cyst, <i>E. nana</i> veg. and cyst, chilomastix, blastocystis, hookworm and trichuris ova. Urine: albumin.	Gavano 1 tab., b.d., for 7½ days.	Negative 2 exams.	Flatulence, Gavano stopped after 7½ days. Indeterminate. Cured.
11	H., M., 31	3 months ..	Scanty <i>E. h.</i> veg. and cyst.	Gavano 1 tab., b.d., for 9 days.	Negative 5 exams.	Failed.
12	M., M., 14	2 years ..	<i>E. h.</i> cyst, <i>E. coli</i> cyst, hookworm ova.	Do.	Very scanty <i>E. h.</i> cyst, <i>E. nana</i> cyst, blastocystis, degenerated polymorphs, few epithelial cells, yeasts.	
13	A.-I., M., 15	....	Few <i>E. h.</i> veg. and cyst, <i>E. nana</i> cyst, blastocystis, trichuris ova.	Do.	Negative 3 exams.	Indeterminate.
14	H., M., 20	2 years ..	Scanty <i>E. h.</i> veg., <i>B. pseudo-carolinus</i> .	I. Gavano 1 tab., b.d., for 9 days.	Negative 6 exams.	Cured.
15	A.-I., M., 9	3 weeks ..	<i>E. h.</i> veg., cellular exudate, yeasts, trichuris ova.	II. Antovaccine Gavano ½ tab., b.d., for 9 days.	Scanty <i>E. h.</i> veg.	Failed.
16	A.-I., F., 46	1 year, emetine	<i>E. h.</i> veg., C.-L. crystals, cellular exudate.	Gavano 1 tab., b.d., for 7 days.	<i>E. h.</i> veg.	Do.
17	E., M., 38	6 months ..	<i>E. h.</i> veg., C.-L. crystals, cellular exudate, <i>B. pseudo-carolinus</i> .	Gavano 1 tab., b.d., for 9 days.	Scanty <i>E. h.</i> veg.	Failed (drowsiness).
18	A.-I., M., 51	3 months ..	<i>E. h.</i> veg., cellular exudate, <i>B. pseudo-carolinus</i> .	Gavano ½ tab., t.d.s., for 6 days.	<i>E. h.</i> veg.	Failed.

Abbreviations used:—

I. Ch. = Indian Christian.
 A.-I. M. = Anglo-Indian male.
 A.-I. F. = Anglo-Indian female.
 M. M. = Mohammedan male.
 H. M. = Hindu male.
 E. M. = European male.

E. h. = *Entamoeba histolytica*.
 veg. = Vegetative.
 C.-L. crystals = Charcot-Leyden crystals.

A perusal of the table will show that 6 patients or 33.4 per cent were cured; in 10 patients or 55.5 per cent the drug failed and 2 or 11.1 per cent were indeterminate. The proportion of probable cures to failures in this series is 1:1.66. In the doses prescribed the drug did not produce the toxic effects of emetine. In two cases slight albuminuria was observed, but the drug does not appear to have any marked irritant effect on the kidneys or the liver. The only visible ill effects produced by the drug were a feeling of discomfort, sometimes amounting to pain, in the epigastriac region, flatulence, heaviness in the head, and occasionally a feeling of drowsiness. Nausea, vomiting and diarrhoea were not seen

in this series. The drug produced no appreciable effect on the pulse or respiration.

Summary and discussion

Gavano is said to be a derivative of ipecacuanha and is believed to be a compound of emetine or cephaeline with an organic acid. It can be taken by the mouth without the nausea and vomiting usually produced by emetine. In therapeutic doses in a series of cases of chronic amoebiasis the drug did not produce any toxic effects on the circulatory and nervous systems, but its amoebicidal properties were not so good as emetine bismuth iodide, the kurchi alkaloids,

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100

PLATE II

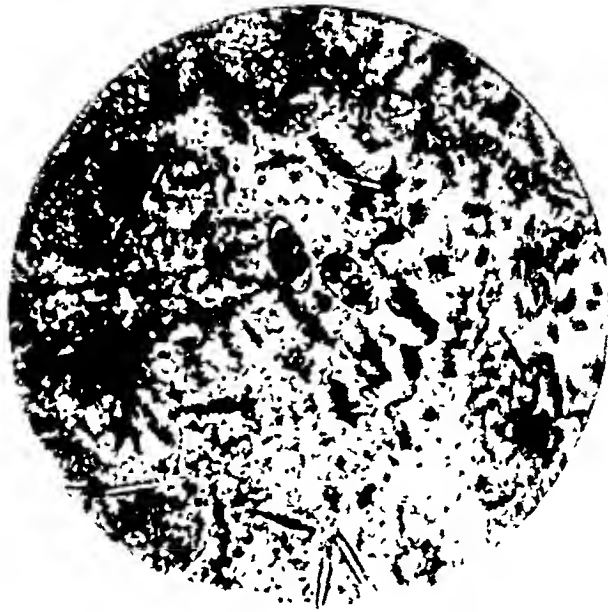


Fig. 1.—Photomicrograph showing two oocysts. In one the cytoplasmic contents are still unsegmented. The other shows the formation of two sporoblasts. Besides, there are many Charcot-Leyden crystals in the film ($\times 360$ approx.).



Fig. 2.—Photomicrograph showing the development of sporozoites within the sporocysts ($\times 800$ approx.).

OBSERVATIONS ON A CASE OF COCCIDIAL INFECTION IN MAN (*ISOSPORA BELLI* WENYON, 1923)

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HUMAN coccidiosis is a rare disease. Altogether about 150 cases have been described in the literature.

Cragg (1917) reported 4 cases from Bombay, but all these patients contracted the infection in the Mediterranean War area.

Knowles (1928) was the first to show that coccidiosis in man exists in India. He discovered very scanty oöcysts 5 times in the mixed faeces of sweepers employed in the various departments of the institution. These men are chiefly natives of Bihar and Orissa. As it has been found that sweepers' stools afford a very rich material for the study of intestinal protozoa, these are collected, mixed together, emulsified in salt solution and supplied to the D. T. M. and L. T. M. classes for the purposes of study.

It is not unlikely that the stool of the same individual harbouring the infection was examined more than once, for it was not possible to single out the infected person or persons.

(Continued from previous page)

or carbarsone. Trials of this drug in acute amœbic dysentery and where the liver is affected may show its utility in these conditions. Neither the kurchi alkaloids nor carbarsone, two of the most effective drugs against chronic amœbiasis, have any effect on liver conditions associated with amœbiasis. Emetine is the only known drug that will abort a threatened liver abscess. Gavano can be administered by the mouth without producing nausea and vomiting and without producing toxic effects on the heart. It is possible that this drug or an allied compound may give us a less toxic drug than emetine for such conditions.

We are very grateful to Messrs. Bayer-Meister Lucius for supplying us with this compound for clinical trials.

REFERENCES

- Acton, H. W., and Chopra, R. N. (1929). Kurchi Bismuthous Iodide: Its Value in the Treatment of Chronic Amœbic Infections of the Bowel. *Indian Med. Gaz.*, Vol. LXIV, p. 481.
- Acton, H. W., and Chopra, R. N. (1933). The Treatment of Chronic Intestinal Amœbiasis with the Alkaloids of *Holarrhena antidysenterica* (Kurchi). *Ibid.*, Vol. LXVII, p. 6.
- Chopra, R. N., Sen, B., and Sen, S. (1933). Treatment of Chronic Intestinal Amœbiasis with Carbarsone. *Ibid.*, Vol. LXVIII, p. 315.
- Knowles, R., Das Gupta, B. M., Dutta Gupta, A. K., and Gupta, U. (1928). The Treatment of Intestinal Amœbiasis. (An Analysis of Results and a Review of the Literature). *Indian Med. Gaz.*, Vol. LXII, p. 455.

The present case was detected on the 2nd December, 1933. The patient is a young Bengali Brahmin.

Previous history.—He has never been abroad. In December, 1925 he had an attack of dysentery from which he recovered after a course of emetine injections. In 1930 he had a similar attack for which he did not seek medical advice. The symptoms disappeared spontaneously.

In March 1932 he developed severe diarrhoea, the stools were voluminous, frothy and slimy. The symptoms persisted for about two weeks. On no occasion were the stools examined.

Present condition.—On the 1st December, the patient was awakened with pain in the abdomen, and diarrhoea. The temperature went up to 99.4°F. on one occasion only. The first specimen of stool was received in the laboratory on the following day.

During the period of the 2nd December to the 8th December, the stools were liquid and slimy in appearance. The motions were frequent.

From the 7th to the 12th the frequency of the stools was diminished, but they were copious and frothy, with flakes of mucus.

During the period the 13th to the 20th December, the stools gradually became formed. Occasionally streaks of mucus were adherent to the formed mass.

Laboratory findings.—The stools were examined daily from the 2nd to the 20th December. Oöcysts were present in fair numbers from the 2nd to the 5th and after that period they gradually decreased in number till they disappeared altogether on the 20th December. From the 6th onwards the oöcysts were so scanty that they could only be detected by the application of concentration methods. Of the various methods advocated by Cropper and Row (1917), Sheather (1923) and Willis (1921), the last-named technique was found most convenient for the purpose, although a certain amount of distortion of the oöcysts takes place owing to shrinkage of the cyst wall, if kept too long in the saturated salt solution.

No other protozoa were found on any occasion, scanty ova of *Trichuris trichura* were found in almost every specimen. Charcot-Leyden crystals were present in large numbers at the beginning, but lessened gradually though a very few crystals were still found in the last specimen examined. No inflammatory cell exudate other than a few desquamated epithelial cells were present on the first two or three days. Every specimen examined showed soap crystals in abundance.

Fresh specimens were plated daily from the 3rd to the 10th December, but on no occasion were organisms of the dysentery group isolated. The serum of the patient during convalescence was also tested against *B. flexner* and *B. shiga*, but no agglutination reaction was obtained.

The parasite.—The oöcysts vary from 25 to 29 microns in length with a characteristic appearance. Specimens kept at room temperature for three days showed the development of typical sporozoites within the sporocysts. The oöcysts were very scanty and were detected only after concentrating, except during the acute stage of the illness when they were present in fair numbers. This shows that, if concentration methods are used for finding the oöcysts, it is possible that a greater incidence might be revealed.

Treatment.—No treatment was given. The symptoms subsided with the diminution in the number of the parasites.

Summary

A case of coccidiosis in a Bengali who has never been abroad is described.

There was severe diarrhoea accompanied with abdominal discomfort, lasting for about a week.

Oöcysts were present in the stools for 18 consecutive days, although they were scanty, except during the acute manifestation of the disease.

Of the concentration methods employed, the one advocated by Willis (1921) for concentration of ova was found most suitable for the purpose.

Charcot-Leyden crystals were persistently present throughout the whole investigation.

No other cause apart from infection with the *Isospora* could be discovered to account for the illness.

I am indebted to Lieut.-Col. R. Knowles, I.M.S., my chief, for his valuable suggestions and to Dr. K. Chatterjee for the history of the patient and the material.

REFERENCES

Cragg, F. W. (1917). Observations on Dysentery Cases from Mesopotamia. *Indian Journ. Med. Res.*, Vol. V, p. 301.

Cropper, J. W., and Harold Row, R. W. (1917). Method of Concentrating Entamoeba Cysts in Stools. *Lancet*, Vol. I, p. 179.

Knowles, R. (1928). *An Introduction to Medical Protozoology*. Thacker, Spink and Co. (1933), Ltd., Calcutta.

Sheather, A. L. (1923). The Detection of Intestinal Protozoa and Mange Parasites by a Flotation Technique. *Journ. Comp. Path. and Therap.*, Vol. XXXVI, p. 266.

Willis, H. W. (1921). Levitation Technique for Detecting Hookworm Ova. *Seventh Annual Report, International Health Board, Rockefeller Foundation*, 1920, p. 91.

SPONTANEOUS PNEUMOTHORAX

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Definition

THE name is given to the condition where air enters the pleural cavity spontaneously, usually as a result of the rupture of the wall of an alveolus.

As early as 1856 M'Dowell described cases of pneumothorax occurring not only in people with pre-existing pulmonary disease but also in apparently-healthy individuals. Cases have been reported in the literature from time to time, and, recently, Kjaergaard (1932) collected a series of 51 cases of spontaneous pneumothorax in the apparently healthy. I have seen several cases of pneumothorax in tuberculous patients, but recently I came across two cases in apparently-healthy individuals; reports of these cases are given below.

Ætiology.—In some rare cases it occurs as a very early sign of commencing lung lesion, but more often during the advanced stages of phthisis. It might also occur as a complication of non-tuberculous diseases of the lungs,

such as carcinoma, abscess, gangrene, or emphyema.

The occurrence of spontaneous pneumothorax in the apparently healthy is in all probability due to rupture of an emphysematous bulla, as shown in six of Kjaergaard's cases that came to autopsy. It is a matter for surprise that pneumothorax rarely occurs in general emphysema. The mechanism of production is something like this. A valvular opening connects the vesicle with a bronchiole in such a way that air can enter the vesicle but cannot leave it. The bulla gets more and more distended until it bursts ultimately, resulting in the free passage of air from the lungs to the pleural cavity. In most cases the opening closes as the vesicle collapses, and the accumulated air is soon absorbed, but if the valvular opening persists, and the integrity of the valve action is maintained, the interpleural pressure rapidly increases, causing considerable discomfort to the patient. If not relieved by repeated aspiration of air, the patient may die of shock or insufficient pulmonary ventilation. In some cases a fistulous free communication persists; in this case a permanent pneumothorax occurs which may cause no evident distress to the individual.

It is more common in men than in women, as shown by Kjaergaard, 36 of whose 51 cases were men. Thirty-six of his cases were between 20 and 40 years of age; 33 occurred on the right side, 17 on the left, and one was bilateral.

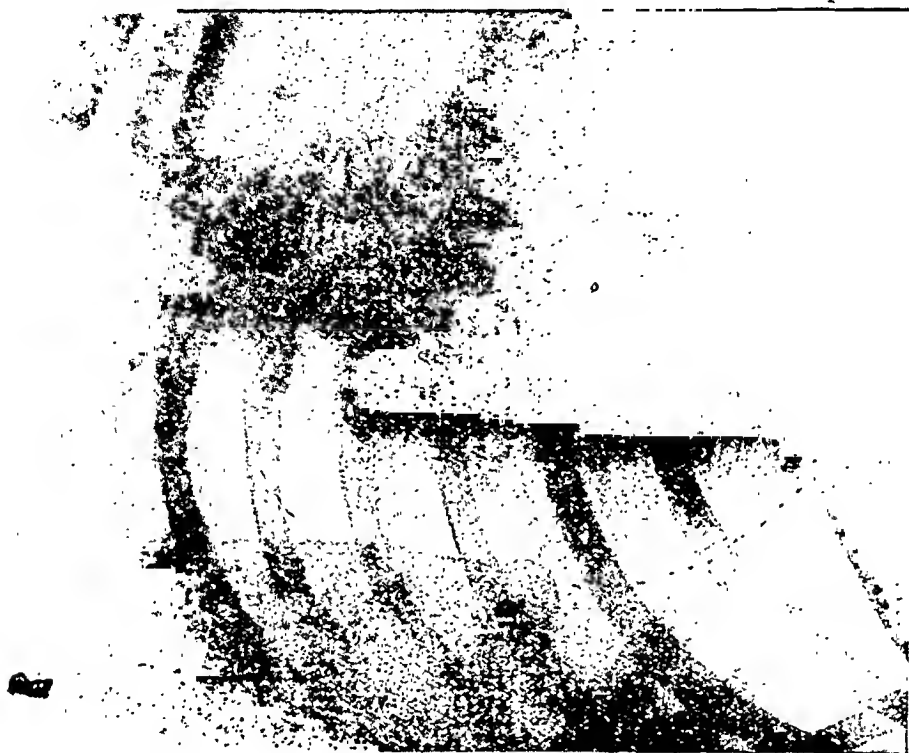
In both my cases the patients were men of apparently strong constitution 24 and 22 years of age, respectively. The right side was affected in one, and the left side in the other.

Symptoms.—It is quite probable that there are a large number of cases of pneumothorax in which the condition is partial; these go unrecognized owing to the absence of marked symptoms. In some cases of advanced tuberculosis with considerable pleural adhesions, partial pneumothorax might occur without causing any additional distress to the patient. Ordinarily when complete pneumothorax occurs spontaneously the patient complains of sudden pain on the side of the chest affected, with a varying amount of dyspnoea. If there is considerable increase of interpleural pressure with displacement of the mediastinum, there will be cyanosis as well. Rarely, death occurs as a result of shock or lack of oxygenation of the blood. Most patients make an uneventful recovery, sooner or later, as the air gets absorbed, but if one of the blood vessels also ruptures along with rupture of an emphysematous bulla, fatal hæmopneumothorax may occur, as in the cases reported by Rolleston (1900) and Newton Pitt (1900). Burrell (1932) is of opinion that if effusion complicates spontaneous pneumothorax, there is sure to be a pre-existing disease of the lung, most probably tuberculosis. In the apparently healthy, effusion hardly ever occurs.

Both the cases reported below recovered rapidly and completely, as the x-ray plates show.

Case (a).—A medical student, aged 24 years, apparently in the best of health, had a sudden catch over the right side of the chest while bending back in the act of yawning. I saw him about twelve hours after the incident. He had considerable pain over the whole

of the right side of the chest, difficulty in breathing and inability to lie on the right side. I proceeded to examine him with the biased idea that it would be a case of pleurisy, but on systematic examination I found deviation of the trachea to the left, displacement of the heart to the left, absence of vocal fremitus and vocal resonance, with tympanitic note on percussion and absence of breath sounds on the right side. Bruit d'airain, so characteristic of pneumothorax, also was



Case (a) 2nd day.
The collapsed lung is outlined.



Case (a) 15th day.
After the lung had expanded again.

present. X-ray showed complete collapse of the lung on the right side. Owing to his being in distress, I removed one litre of air; this gave him almost immediate relief. X-ray ten days later showed almost complete absorption of air from the pleural cavity. The lungs were apparently normal, and he did not exhibit any symptoms pertaining to disease of the lung.

Case (b)—A deck-hand, aged 22 years, had a sudden pain on the left side of the chest during the ordinary

course of his duties. He was sent to the Royapuram hospital with a diagnosis of pleurisy with effusion, four days later. X-ray examination revealed partial pneumothorax on the left side. He had no distress whatsoever. He showed complete absorption on examination by x-ray ten days later. The lungs were apparently in a healthy condition.

(Continued at foot of opposite page)



Case (b) 4th day



Case (b) 12th day.

THE ACID AND SANITOL TREATMENT OF THE INTESTINAL FLUXES

By F. J. PALMER, F.R.C.S.I.

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IN 1924, the writer published a paper on the treatment of cholera by cresol, and in the following year, 1925, a further paper in which he described what seemed to him the better results

(Continued from previous page)

Diagnosis is easy when the pneumothorax is complete. Hyper-resonance with absence of breath sounds and displacement of the mediastinum to the opposite side are quite characteristic, it may be difficult if the air cavity is encysted as in advanced phthisis. If there is only partial pneumothorax confined to the upper portion of the pleural cavity, as in the second of the cases reported above, the relative difference in resonance between the upper and lower portions might lead to the mistaken diagnosis of pleural thickening or effusion at the base. X-ray examination, of course, will clinch the diagnosis.

The prognosis depends on the ætiological factor. When it occurs in the apparently healthy, recovery is certain except when it is associated with fatal shock, or fatal hæmorrhage. Pyopneumothorax resulting from rupture of an abscess will often recover after energetic treatment. When pneumothorax occurs in the early stages of tuberculosis, it may be considered as a desirable accident, since it will produce collapse of the lung. In the advanced stage it often results in pyopneumothorax which makes the prognosis of the condition worse.

Treatment.—If it occurs in the apparently healthy, no treatment is required, unless the patient is considerably distressed, when aspiration of air is indicated. In acute tuberculosis it is advisable to maintain the collapse of the lung with refills, but, if pyopneumothorax occurs, Burrel advocates aspiration and washing out of the pleural cavity with Dakin's solution. In resistant cases obliteration of the cavity can be done only by resorting to thoracoplasty.

[Note.—Attention is drawn to the report on a case of pneumothorax, by H. W. Acton and Darmendra, in our issue of May 1933.—EDITOR, I. M. G.]

REFERENCES

- Burrel, L. S. T. (1932). Spontaneous Pneumothorax. *Tubercle*, XIII, 433.
 Kjaergaard, H. (1932). Spontaneous Pneumothorax in the Apparently Healthy. *Acta. Med. Scandinavia*, Supp. 43.
 M'Dowell (1856). On an Unusual Form of Pneumothorax. *Dublin Hosp. Gaz.*, p. 227.
 Pitt, G. N. (1900). Rapidly Fatal Hæmopneumothorax due to Rupture of an Emphysematous Bulla. *Trans. Clin. Soc.*, XXXIII, 95.
 Rolleston, H. D. (1900). A Case of Fatal Hæmopneumothorax of Unexplained Origin. *Ibid.*, XXXIII, 90.

obtained by the addition of acid to the cresol. This was followed by a third paper in 1928, in which the dosage of acid was somewhat increased, and sanitol recommended.

The sanitol used should be as fresh as possible, as when kept for some time, and especially if exposed to air, the solution, or, more strictly speaking, the emulsion, becomes of slightly brownish colour, instead of the milky-white emulsion formed when fresh sanitol is added to water.

When the mixture is of this colour it may be found that minute tarry globules appear on the surface shortly after the addition of acid, when the sanitol is quite fresh this only occurs after a considerable interval.

Why acid has not been used of recent years in the treatment of the more severe intestinal fluxes is difficult to see, but it was probably due to the fear of inducing acidosis, and this it was which at first deterred the writer, until he found it to be a more or less negligible bug-bear in such cases.

It has long been known that the cholera vibrio is susceptible to acid, as is also the food poisoning, the Salmonella, group, which is extremely susceptible, and the writer claims to have proved clinically that to these may be added the dysentery bacilli, and those other members of the great group of colon bacilli which produce so many of the infective diarrhæas.

The use of acid is no new thing for the treatment of diarrhæa. The old clinicians used it, and an acid mixture was, it is understood, in use for the treatment of cholera by the surgeons of the Company days. When the writer first came to India, quite an effective *mistura pro diarrhæa*, containing acid, was in the medical panniers of those days.

The clinical observations of these older physicians was sound, but their explanation that the good effects of acid were due to its astringent action was incorrect. The beneficial effects are due to the inhibiting effect produced upon the unbridled growth of the infecting organisms in the bowel.

The older explanation is still current, however, in many works on therapeutics and materia medica.

Since contributing the earlier papers the writer has gradually increased the dosage of acid, as he found his fears of acidosis more or less groundless. There is far more acidosis induced by an unbridled intestinal flux, than by the acid used in conjunction with a weak antiseptic to check it. During the continuance of the flux, the current is from within outward, and little absorption appears to take place.

It is now proposed briefly to recapitulate the treatment and explain the guiding principle, giving a résumé of its use in the various intestinal fluxes, with the difficulties encountered, and the results based on the experience of many years of treatment by one method, in many hundreds, if not over a thousand, cases.

The guiding principle is to wash out the intestine in all infective bowel fluxes with a weak solution of sanitol of constant strength, reinforced by the addition of acid. This solution is of constant strength as regards sanitol, and variation of dosage according to age is obtained by varying the amount given.

The amount of acid varies with the age or size of the patient, and a little consideration will show that in this way the dosage is more or less in proportion to the area of bowel to be treated.

These doses are washed down by draughts of tepid water in the more acute fluxes, the result obtained being, as it were, to flush out the intestine with a weak bactericidal and growth-inhibiting solution, much as we would flush out a drain.

To grasp fully the ideas underlying the treatment, a study of the previous papers on the subject would be an advantage to those interested in the subject, for they form a definite sequence.

This method of treatment is not meant to apply to amœbic dysentery, but is of otherwise general application to almost every case of infective diarrhœa, through the gamut of simple diarrhœa, the choleraic diarrhœas, food poisonings, and bacillary dysenteries.

The dosage is as follows :—

Ages, in years	Cresol, in minims	Acid. sulph. aromat., in minims	Water, in ounces
1 to 3	1	4 to 6	1
3 to 6	2	6 to 8	2
6 to 9	3	8 to 10	3
9 to 12	3	10 to 12	3
12 upwards	4 to 5	12 to 20	4

The cresol dilution should be made up as freshly as possible and the acid, where possible, only added immediately before administration. A pipette may be used for making up the mixture.

In some cases it may be necessary, for convenience, to make up the cresol solution in one bottle, and the acid in another, marking the doses by the usual strips of paper, and leaving the relatives to administer the doses, but this should be avoided as much as possible.

The method, as employed in cholera, food poisoning, the choleraic diarrhœas—or the clinical choleras, as the writer prefers to call them, for he recognizes more than one variety—and the more acute and fulminating dysenteries, is as follows :—

The above doses according to age are given every quarter of an hour for eight doses, and thereafter every half hour for four doses, the treatment thus taking up four hours, during which twelve doses are administered, eight in the first two hours, and four in the second two

hours. The acid is then omitted, and sanitol alone in appropriate age dosage is given every hour for the next twenty-four hours.

In previous papers, for fear of acidosis, sanitol only every second hour on the next day was recommended, and on the third day three hourly. With greater experience I see no objection to giving the acid and sanitol mixture every second hour next day, and three-hourly on the third day.

This is the ideal to be aimed at, and can generally be more or less obtained, but it should be borne in mind that if, for any reason, there is difficulty in administration or retention, it is better that weaker, smaller, or less frequent doses be given, and retained, than that stronger, larger, or more frequent doses be attempted and rejected.

If nausea and vomiting are present, retention can generally be assured by administration for adults of tinctura chloroformi et morphinæ co., minims 15, tinctura opii minims 20 to 25, or the injection of $\frac{1}{4}$ grain of morphia hypodermically.

The patient is encouraged to drink small quantities of tepid water at frequent intervals between doses if possible, this lessens the irritation of the medicine, and increases intestinal lavage and voiding of toxic bowel contents, and may add some much-needed fluid to the system, should stomach absorption recommence as the toxicity lessens.

It will be observed that the strength of sanitol never varies, but remains one minim to an ounce of water, to keep gastric irritation at a minimum and secure retention.

The choleraic diarrhœas,* food poisonings, and the fulminating dysenteries should be treated in the same way as cholera, and should collapse be severe in any of them, transfusion may be given in addition. In simple diarrhœas administration four to six times daily will suffice. As the severity of the diarrhœa with which one has to deal increases, it will be found that a more frequent dosage is required to check it, so that doses six, eight, or ten times in the 24 hours may be required, until in the most severe cases one reaches the necessity for the same intensive treatment as in cholera.

In the diarrhœa, choleraic diarrhœa, and food poisoning groups, the treatment is definitely specific, and no case is lost which is admitted

[* In his original typescript the writer used the expression 'the choleras', a term that he considers should be used to cover the large group of acute intestinal disturbances of mixed ætiology that are encountered in his tea-estate practice; in his opinion some of these are true vibronic cholera. As the word 'cholera' has acquired a specific significance, we have, with the author's permission (though not altogether with his approval), modified his paper and introduced the expression 'choleraic diarrhœa'. We do not, however, question the writer's statement that some of the cases are true cholera and that these react as well to his treatment as do the acute dysenteries of non-vibronic origin.—EDITOR, I. M. G.]

before deep collapse has taken place. In these cases in which all the infection is within the bowel, and there is comparatively little destruction of the bowel wall, the antiseptic treatment is easier of application than in the dysenteries where marked destruction of bowel wall may have taken place. The writer pointed this out long ago, and the point has recently been stressed by McCay (1932).

As I have stated, this method of treatment is applicable to the great majority of diarrhoeas, and the diarrhoea which sometimes occurs with influenza or malaria is best treated by some four to six doses or more of the acid antiseptic mixture daily.

The enteritis which is often such a dangerous sequela of measles is also greatly benefited by a similar line of treatment and, in 1930, twenty-one such cases were treated by the Indian doctor of one of the writer's gardens with only one death. In the previous year, before this treatment was adopted there were many deaths from this cause.

The diarrhoea of enteric fever when severe is often greatly benefited and lessened by a few doses of the mixture, which probably acts in most of these cases by checking the increased multiplication of the more toxic members of the *coli* group that occurs whenever the contents of the bowel become more fluid in character.

In endeavouring to explain the application of the method of treatment in dysentery, one is up against a much more difficult problem than in the class of case already considered.

Whilst in the great group of diarrhoeas, choleraic diarrhoeas, and food poisonings, there is little structural damage to the bowel beyond a catarrhal inflammation easily repaired if the cause be checked, in the dysenteries actual destruction of the intestinal mucosa occurs only after the disease has lasted for a short time.

The more severe types of bacillary dysentery are febrile and it is the writer's experience that, if fever has lasted with first discomfort and then gradually increasing pain in the abdomen for two or three days before, the motions become frequent, and contain blood and mucus.

At this stage the involvement of the mucosa is presumably not severe, and confined either to the surface or a small area of the bowel, and the effect of treatment on the lincs already indicated is generally dramatic. The temperature falls rapidly to normal, the number of stools quickly decreases, and I have seen such patients pass a semi-solid stool with a slight trace of mucus, or perhaps even none, within three days.

And the improvement is not only confined to the milder cases; the fulminating cases often do extremely well because the onset is so severe that they are compelled to seek treatment much earlier than they otherwise would.

The fulminating cases should be treated by an intensive course, as in cholera, with the addition of transfusion if required.

In all such severe cases, be they cholera, food poisoning, or dysentery, I wish to stress the importance of treatment at night. The necessity for this is not so apparent in the minor cases, but in those of the greatest severity, arrangements should be made to give a few doses at night, so that the bowel is never without some inhibiting and bactericidal mixture. In less severe cases it may only be necessary to make the night interval as short as possible, and give one dose the last thing at night and another the first thing in the morning. Only in the severe dysenteries will the necessity for this extend beyond the first night or two.

On the second day eight to ten doses may be given in the twenty-four hours, on the third day six to eight according to the severity of the case. Six to eight doses a day may thereafter be continued for a few days longer, decreased to four daily, finally intermitted for a couple of days, and resumed again. This is to keep up an inhibitory action until the bowel lesions have healed. During this period food may be slowly but gradually increased.

In a few late cases of extreme severity, I have been forced to keep up treatment with more frequent doses for a longer period with an occasional couple of days' intermission.

In cases less intense an hourly dose of the mixture on the first day often suffices, but in all really severe cases it is best to begin with the intensive treatment, reducing the daily doses as before.

Regarding the clinical classification of dysentery, I consider under ten motions in twenty-four hours as mild, ten to twenty as medium, twenty to thirty as severe, and above thirty as very severe.*

The following recent case is worth recording:—

I was called to see a European in his third day of illness. He had had fever and nausea for two days with gradually increasing pain and discomfort in the abdomen, and had been treated by the garden doctor for malaria. When I saw him in the afternoon his temperature was 101.6°F., a basin with much vomit lay alongside the bed, and some eight motions containing first mucus and then mucus and blood had been passed since morning. The stool was watery, only slightly faecal, and contained much mucus and some blood.

On account of the vomiting it was doubtful if the mixture would be retained, but 15 minims of tinctura chloroformi et morphinae co. enabled him to take ten doses that afternoon and evening. The pain in the stomach lessened and he passed a good night. Next morning, and thereafter, his temperature was normal. One semi-solid stool was passed next day with a trace of mucus, and thereafter solid stools. Eight doses were given the second day, six the third, and four thereafter for a week, and he resumed work on the fifth day.

* The exact number of motions is difficult to ascertain in tea-garden practice and in all cases a cigarette tin and a number of small bits of sticks are given to the patient, a bit of stick to be placed in the tin after each motion. This gives as much accuracy as one is likely to obtain in the absence of skilled nursing.

We have next to consider the most anxious cases of all, and these one should scarcely ever find in Europeans, though they are only too frequent in the coolies with whom one has generally to deal.

In this class of case everything is against one: the diet, the lack of nursing, and the lateness of the case. Some of these coolies have been over a week ill, some a fortnight, and some even three weeks.

Let us consider for a moment the condition of the bowel in such cases. There are numerous ulcerated areas, some still covered with a slough, some from which the necrotic portions of mucous membrane have recently separated. Owing to the irritation and inflammation, the bowel is constantly on the move, and cases with fifty motions, or more, are not uncommon. In such cases any medicine we can give is hurried through so rapidly that it has little time to act on the causal organisms, which are, moreover, protected from its action by a layer of mucus or slough.

In addition, an alkaline exudation is poured out by the irritated mucosa, and all these conditions make more difficult the application of an antiseptic and acid treatment, while all except the last hinder the action of such a remedy as the bacteriophage as well.

The reaction of the stools to litmus paper is here a useful guide; if an acid reaction can be obtained improvement occurs much more quickly than if for some time it is found impossible to effect the turn in reaction.

A little further consideration will explain what at first sight may seem difficult to understand, and make a novice doubtful of the value of the treatment if his first experience of it is in such a case.

Even if all the virulent invading organisms be destroyed in such a case, one would still be faced with the healing of large ulcerated areas, bathed in septic exudate, the pabulum of numerous secondary invaders, and healing can only take place very slowly, so that rapid improvement cannot be expected with any treatment.

A proportion of these cases are beyond help, and the damage done before treatment is commenced is so extensive that sooner or later a fatal result inevitably occurs. In such cases no extravagant claims are made for either antiserum or bacteriophage and, though I have often used the former as an auxiliary, I have not, as a rule, seen much benefit therefrom.

The first sign of improvement is a reduction in temperature, and a fall to normal, either quickly, in an earlier case or one of infection by one of the less virulent of the dysentery group of organisms, or later and gradual, in a late case of the more virulent infections. However, in the late-seen and most severe infections of all, those in which the number of stools may be above thirty and as high as sixty in the twenty-four hours, there may be a period of

three days or so after commencing treatment in which the number of motions may actually rise a little in frequency. How much this is due to partial failure of the treatment in the most desperate cases, in other words, inability to render the rapidly-moving bowel exudate acid and antiseptic enough, how much due to the added irritation of cresol on an already intensely irritated and inflamed bowel, and how much simply due to more accurate counting of motions in such grave cases, it is hard to say. It can scarcely be due to irritation from acid, for in such cases it is extremely difficult to render the bowel exudate acid, and I propose, should opportunity occur this season, to increase still further the dose of acid in such cases.

In cases of this description opiates may be of considerable value by lessening pain and irritability; and by lessening the number of motions, enable the acid and antiseptic mixture to act longer upon the affected portion of bowel.

Mixed bacillary and amœbic infection

On first admission every case of dysentery of any severity is treated by the antiseptic method. As the results of amœbic infection are not so rapidly progressive as bacillary, there is still plenty of time for the therapeutic intervention with emetine, should the first treatment fail, or seem only partially effective. Should the opposite line of attack be adopted, and emetine be used first, it may be sometimes impossible successfully to counter the damage done by a virulent bacillary infection during the first few days in which the emetine treatment is being tried out.

There is one fact in the treatment of some of the cases presenting themselves late for treatment which at first I found extremely puzzling. In several such cases the response to acid and sanitol seemed to be delayed beyond five days, and acid and sanitol was suspended, and emetine tried. In many such cases there was a definite reduction in the number of stools within a few days, and this seemed a clear proof that the case must be one of mixed infection. In some cases, however, in spite of the continuance of emetine, the number of stools again increased, and there was a tendency for the temperature to rise, both of which manifestations were checked by a return to the acid and sanitol treatment.

On thinking it over it seemed to me that the decrease in the number of motions was due, in some cases, to the cessation of the super-added irritation of the acid and sanitol just as irrigation will, in some cases of specific urethritis, lead to a continuance of catarrh.

In some such cases I have simply stopped the acid and sanitol, and the same improvement has occurred as in the cases where emetine was used; and in most cases now, before beginning emetine treatment, a couple of days without any treatment is allowed to elapse, and the

reduction in number of stools *after* that time is taken as the measure of response to emetine.

This is one of the points in which it is most difficult to convince one inexperienced in this method of treatment, and the doubt was only resolved in my own case after numerous experiences of the rapid cures achieved in genuine early cases.

Another point in the treatment of these late cases of the more severe type is that, unlike the rapid daily reduction in the number of motions in the earlier cases, the reduction is much more gradual. Quite a common sequence being 15, 15, 14, 13, 12, 12, 10, and so on, the slow reduction being an indication of the very gradual healing of a large ulcerated area.

These difficulties only occur in late cases; it may, I think, be taken as axiomatic that green sloughs are *not* passed in the first few days of the attack, and that any case in which such appearances are present in the stools is in all probability nearly a week old, if not older. It is only the coolie who is so reluctant to seek early treatment, and my experience with the few Europeans, whom I have so far had occasion to treat by this method, has been uniformly favourable.

My practice now is to continue the acid and sanitol treatment in late and severe cases for periods of ten days or a fortnight, beginning with more numerous doses and gradually working down to six doses daily, and finally to four. At the end of this I often discontinue the treatment for a couple of days, and then resume again for three days, and so on, in alternate periods of treatment and intermission, until the patient is cured. In cases in which mixed infection is thought to be possibly present, the periods of intermission are often used for emetine injections.

McCay (1932) gave a mortality of 8.2 per cent for 231 cases of bacillary dysentery treated in the Presidency Hospital, Calcutta. His greatest mortality occurred in children.

In a series of 320 cases in one large garden treated under tea-garden conditions, during two epidemic years, and minus all the refinements of food and nursing, there were 34 deaths, making a mortality rate of 10.6 per cent, and these deaths occurred entirely in children and late cases. Though these were not all bacillary cases, certainly the majority were, the diagnosis being made clinically and therapeutically. Any gain in mortality figures obtained in this way is more than offset by the hopeless condition in which some patients were admitted. Included in these figures are absconders who, sick unto death, struggled back to the garden they had left, to die within a few days of admission to hospital.

Regarding the likelihood of relapse after this form of treatment, I have not seen a single relapse in a case admitted early. I have no

accurate figures for the relapse rate in later cases, but it is comparatively small.

Criticisms of and difficulties of this treatment

(1) The danger of producing acidosis; this, which for years deterred me from using any but minute doses of acid, is, I find with increasing experience, scarcely, if at all, evident.

(2) The effect of cresol on the kidneys; Ganguly (1925) drew attention to the fact that few cases of uræmia occurred when cholera was treated by izal, in accordance with my first cresol method but using a different brand of cresol, but he expressed surprise at this.

I can only say that since treating cases of cholera in this manner, I have not seen any cases of uræmia, though previously I came across them fairly frequently.

In dysentery, where the treatment with acid and sanitol has been continued for a long time in late-admission cases, I have twice come across children with œdema of the legs and slight albuminuria, but this has cleared up in both cases on stopping treatment by sanitol, and giving acid only. On the other hand, some œdema of the feet is very common in all cases of late dysentery admitted to hospital, and it may be accompanied by slight albuminuria as well, so that it is not at all certain that the transient albuminuria was the result of the drug.

(3) That the mixture is difficult to take; this is not particularly the case, and anyone who wishes to compare it with the essential-oil mixture will, I think, find that it is much less nauseating. I have recently had two Europeans upon this mixture, and both found little difficulty in taking it, but it is, of course, more difficult to take than the bacteriophage.

(4) Difficulty in administering to young children; this is a very real difficulty, but it is one which applies to nearly every medicine administered to children. Administration in small quantities, and holding the nose and closing the mouth until swallowing has taken place often suffices. Children of even under a year have been so treated, though I fancy the small amounts administered could do little more than facilitate the working of the *vis medicatrix naturæ*.

The difficulty in administration of medicine, the late date at which Indian children are often brought for treatment, and the delicacy of the bowel mucosa, all probably contribute to the greater mortality in such cases.

In conclusion let me emphasize that this method of treatment is polyvalent, and applicable to all the bacillary intestinal infections, with perhaps two exceptions.

The first of these is *B. pyocyaneus* infection, in which, on other grounds, I am doubtful of the antiseptic value of the cresol group. For such, probably acid alone would be as useful as acid and sanitol.

(Continued at foot of next page)

OBSERVATIONS ON THE NORMAL DIET- ARY OF INFANTS AND CHILDREN IN VIZAGAPATAM

By M. V. RADHAKRISHNA RAO, M.B., B.S.

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(From the Out-Patient Department, King George Hospital, Vizagapatam)

COOMAR (1888), Bose (1890), Nandi (1931), Mukherji (1922), Green-Armytage (1926) and Green-Armytage and Vere Hodge (1929), among others, have pointed out that the irregularities in the feeding of children are associated to a great extent with the causation of infantile biliary cirrhosis. These observers, especially Coomar, laid great stress on the importance of studying the hygienic and dietetic conditions in children suffering from infantile biliary cirrhosis to elucidate the cause of the disease. Before proceeding with the study of this subject, the normal dietary of infants and children in Vizagapatam was carefully investigated and is recorded in this paper, with a view to denoting the deviations from the normal in the dietary of children suffering from infantile biliary cirrhosis.

The material in this paper consists of an analysis of the case-notes of 1,100 children (below 5 years) carefully examined in the medical out-patient department of the King George Hospital, Vizagapatam. Detailed notes were taken about the diet of the children from the parents or guardians accompanying them. The children are roughly classified into different classes according to the status of the parents or guardians.

(Continued from previous page)

The second class of case is one of a rare and obstinate variety of dysentery, which on culture has given large numbers of lactose-fermenting streptococci in almost pure culture. Whether this is identical with the organism isolated by Bergen, or merely a secondary infection, I am unable to say. In the few cases in which I have found it, it seemed to me that better results were obtained from slightly increased doses of sanitol only, but, so far, this is an impression lacking absolute conviction.

I believe those who may decide to try this method of treatment will have no reason to regret it.

REFERENCES

- Ganguly, L. (1925). Izal in Cholera. *Indian Med. Gaz.*, LX, 467.
McCay, F. H. (1932). The Treatment of Bacillary Dysentery by Bacteriophage. *Ibid.*, LXVII, 666.
Palmer, F. J. (1924). The Treatment of Cholera by Cresol. *Ibid.*, LIX, 381.
Palmer, F. J. (1925). The Treatment of Cholera by Cresol and Acid. *Ibid.*, LX, 155.
Palmer, F. J. (1928). The Treatment of Cholera by Acid and Cresol. *Ibid.*, LXIII, 259.

Most of the children belonged to the Hindu community as may be seen from the analysis below :—

Religion	Number
Hindus ..	986
Christians ..	30
Anglo-Indians ..	16
Mohammedans ..	67
Martwaris ..	1

The age distribution of the 1,100 children is given below. Most of the children examined were under 3 years :—

Age in years	Number
Under 1 year ..	363
1-2 years ..	303
2-3 " ..	248
3-4 " ..	115
4-5 " ..	71

The table shows the results of the investigation into the mode of feeding in these children examined. It will be seen that breast-feeding of the children is the invariable rule among all the classes, except in a few cases (25 in this series) in which it was contra-indicated on account of the mother's poor health. The rules laid down regarding the breast-feeding of children (e.g., the quantity at each feed, and the interval between the feeds) are never followed, especially by poor and lower middle-class mothers. The women of the poor class suckle their children usually till the end of the second year, but sometimes they do so till the end of the third or fourth year. These women belong to the labouring class and are fairly healthy. Their diet is very poor (especially in vitamins) and consists of rice and *cholan*, with little or no vegetables and excess of chillies; meat, fish, milk or milk-products are only taken occasionally. In the middle and rich classes the children are generally weaned at the end of the first year.

The custom of feeding children by a wet nurse is not very prevalent. In a few cases, in which the mother died after the birth of the child, this method was resorted to, and in all these instances the wet nurse happened to be from the same family.

Though goat's milk very nearly approaches human milk in composition and is easily digested, the idea of feeding children with this milk is not popular. Only in two cases was goat's milk given in addition to breast-milk.

Breast-milk is frequently supplemented with cow's milk. Buffalo-milk is generally not used in the dietary of infants. The artificial feeding of infants with cow's milk is highly unsatisfactory among all the classes, especially the poor and lower middle classes. The milk is

invariably boiled and diluted before use and the cream is generally removed. In the poor and lower middle classes the milk is diluted according to the whims of the ignorant mothers and often the diluted cow's milk is continued even after the age of one year; in most cases, the diluted cow's milk is given from birth to supplement breast-milk. The addition of sugar to

the diluted milk is neither constant, nor proportional. The children in these classes are either over fed or under fed and gastro-intestinal disturbances are very common. Even the mothers belonging to the upper middle and rich classes, especially the Hindus, are equally ignorant about the proper methods of 'humanizing' cow-milk before it is given to the infants, and very

TABLE

Showing the mode of feeding in 1,100 children examined in the medical out-patient department.
King George Hospital, Vizagapatam

	Nature of food		Poor class	Middle class (lower and upper)	Rich class	Total
1	Breast-milk ..	Up to 6th month ..	68	108	8	184
		Up to 1st year ..	82	333	23	438
		Up to 2nd year ..	127	173	13	313
		Up to 3rd year ..	82	28	..	110
		Up to 4th year ..	20	4	1	25
		Up to 5th year ..	4	1	..	5
		TOTALS ..	383	647	45	1,075
2	Breast-milk and cow's milk.	From birth ..	65	46	..	111
		From 6th month ..	50	92	14	156
		From 1st year ..	36	68	9	113
		From 1½ years ..	1	6	..	7
		From 2nd year ..	8	8	1	17
		TOTALS ..	160	220	24	404
3	Breast-milk and goat's milk.	....	1	1	..	2
4	Cow's milk only from birth.	....	1	9	1	11
5	Breast-milk and patent milk foods.	Condensed milk. (Nestle's—milk maid brand).	46	75	2	123
		Horlick's milk ..	..	33	6	39
		Glaxo ..	..	39	11	50
		Nestle's milk ..	..	1	..	1
		Mellin's food ..	..	1	1	2
		Lactogen ..	..	1	..	1
		Allenbury's foods ..	..	1	1	2
		Ovaltine (with cow's milk) ..	..	5	1	6
		Cow and Gate milk ..	..	1	..	1
		TOTALS ..	46	157	22	225
6	Patent foods only	Condensed milk. (Nestle's)	2	4	1	7
		Horlick's milk ..	..	2	..	2
		Glaxo ..	..	3	2	5
		TOTALS ..	2	9	3	14
7	Rice ..	From 6th month ..	35	10	..	45
		From 9th month ..	69	30	6	105
		From 1st year ..	216	393	26	635
		From 1½ years ..	13	23	2	38
		From 2 years ..	25	26	2	53
		From 2½ years ..	..	2	..	2
		From 3 years ..	5	4	..	9
		TOTALS ..	363	488	36	887

little attention is paid to the general hygiene necessary in artificial feeding.

The selection and the use of tinned and patent milk-foods varies in the different classes. Nestle's sweetened condensed milk is the favourite form of tinned milk-food given to the infants of the poor and lower middle classes. Horlick's malted milk and Glaxo (full cream) are generally used by the upper middle and rich classes. These foods are given instead of cow's milk to supplement breast-milk. In a few cases (14 in this series) they are given from birth. In selecting these foods, the choice is generally made by the parents, or on the advice of friends or relatives, irrespective of the requirements of the baby at a particular period, and medical advice is only sought for when the several preparations on the market are tried and found unsuitable to the baby. The Anglo-Indian and some of the Christian mothers are more careful in this respect. Their children are generally healthier and stronger than the children belonging to the other communities.

In most cases starchy food in the shape of rice is given from the end of the first year. Children of the poor class are often given rice or rice-congee from the end of the 6th or 7th month. At first they are fed on rice with pepper-water (*rasam*) only, but afterwards also on small quantities of all the foods prepared for the adult members of the family. Such additions are made gradually. Rice is the staple article of diet in all classes and in the vegetarian families there is an excess of carbohydrate in the diet. Though the children belonging to the poor and lower middle classes are mostly non-vegetarians, yet meat and fish are given to them only occasionally.

When once the child is given rice-diet regularly, cow's milk is generally stopped, except in some of the middle and rich class children, who are given small quantities of milk in coffee or ovaltine. In the poor class breast-feeding is continued, sometimes up to the end of the fourth year, even after starting the children on regular rice-diet.

Fruit juices are not generally given to the infants in all the classes, unless they are recommended by a doctor.

Summary

Observations on the normal dietary of infants and children in Vizagapatam, based on a careful investigation of 1,100 children in the medical out-patient department of the King George Hospital, are recorded in this paper. It is observed that :—

(1) the infants are invariably fed on breast-milk except in the few instances in which it was stopped on account of the poor health of the mother;

(2) the artificial feeding of children is very unsatisfactory, especially in the poor and lower middle classes; and

(3) starchy foods are given very early to the children by the poor class mothers.

Acknowledgment

I wish to express my thanks to Rao Bahadur Dr. T. S. Tirumurti, Professor of Pathology, Medical College, Vizagapatam, under whose direction this investigation was commenced, and to the Superintendent, King George Hospital, Vizagapatam, for giving me every facility in the out-patient department of the hospital to carry out this investigation.

REFERENCES

- Bose, K. C. (1890). Remarks on the Hypertrophied Liver of Children in this Country. *Indian Med. Gaz.*, XXV, 245.
 Coomar, B. B. (1888). Enlargement of the Liver in Children. *Ibid.*, XXXIII, 148.
 Green-Armytage, V. B. (1926). Infantile Cirrhosis of the Liver. *Ibid.*, LXI, 441.
 Green-Armytage, V. B., and Vere Hodge, E. H. (1929). Infantile Liver. *Birch's Management and Medical Treatment of Children in India*. 7th Edn. Thacker, Spink and Co. (1933), Ltd., Calcutta.
 Mukherji, S. K. (1922). *Infantile Cirrhosis of Liver*. Indian Medical Record Book Dept., Calcutta.
 Nandi, P. (1931). Infantile Biliary Cirrhosis. *Indian Journ. Med.*, XII, 182.

A Mirror of Hospital Practice

A FATAL CASE OF CHRONIC INTERSTITIAL NEPHRITIS WITH VERY HIGH BLOOD UREA

By R. N. CHOPRA, C.I.E., M.A., M.D. (Cantab.)
 LIEUTENANT-COLONEL, I.M.S.

and

R. N. CHOUDHURY, M.B. (Cal.)

(From the Carmichael Hospital for Tropical Diseases, School of Tropical Medicine, Calcutta)

M. K., a medium-built, anæmic, vegetarian, Punjabi Hindu male, aged 43 years, was admitted into the Carmichael Hospital for Tropical Diseases with the history of persistent dyspnoea for the past three weeks and hiccough for the last 12 days. He also complained of scanty urine, giddiness, loss of memory and insomnia. He was said to have had high blood pressure. About a year ago he suffered from dysentery and influenza; there was no history of syphilis.

On admission the patient had orthopnoea, intermittent hiccough, restlessness, subnormal temperature, oedema of the feet and moderate ascites. He had pyorrhoea, and his tongue was coated and somewhat dry. His face was pale and the veins of his neck were engorged. There was congestion of the bases of both the lungs. The apex beat was in the 6th interspace $1\frac{1}{2}$ inches outside the left mid-clavicular line. The first sound was muffled, and the aortic second sound was accentuated. The pulse rate ranged between 90 and 110 per minute. The blood pressure was systolic 200 Hg. mm., diastolic 125 Hg. mm. and the radial artery was thickened. The liver was enlarged and tender, and pulsation of its lower border synchronously with the heart beat could be distinctly felt.

The urinary output ranged between 10 to 20 ounces per diem. The urine contained 0.38 per cent of albumin with a few hyaline casts; a moderate amount of urobilin and indican and a fair number of pus cells were present; a few red blood corpuscles and calcium oxalate crystals, and numerous bacteria were also found. On examination of the stools no protozoa except *Blastocystis hominis* were detected and on plating *Salmonella morgani* was isolated. *Trichostrongylus* ova were found in the stool.

The case was diagnosed as one of chronic interstitial nephritis with dilatation and failing of the heart. He was ordered blue pill and magnesium sulphate and was also given over three drachms of digifortis in three days followed by diuretin, but with no beneficial results. The hicough continued unabated, the urine secretion was not increased and the patient could not get a wink of sleep. On the last day, an intravenous injection of glucose with strophanthin was given and leeches were applied over the liver region without any effect. The patient remained conscious though very restless till his death on the fifth day after admission.

The interest of this case lies in the fact that an examination of the blood 12 hours before death showed 220 mgm. per 100 c.cm. of urea, the normal urea in Indians being 15 to 20 mgm. The patient did not get any convulsions with this high urea content, was quite conscious and notwithstanding it lived for more than twelve hours.

A CASE OF APLASTIC ANÆMIA

By P. N. MITRA, M.B., D.T.M.

Teacher of Pathology, Berry White Medical School, Dibrugarh

THE patient J., a Hindu male, aged 38, married, was working as a ward servant and was admitted for treatment of giddiness, of one week's duration.

23rd August. On admission his pulse was 100 and respiration 28 per minute, and temperature 98°F. There was nothing particular about his family history, personal history and previous illnesses. About a week before admission he scratched his right ear with a match stick and lost about half an ounce of blood. He also took a dose of oil of chenopodium and felt weak and giddy, after the purging which followed the drug. He was however working up to the day of admission.

Physical examination. Of average physique; extremely anæmic; no jaundice, no glandular enlargement.

Gums—spongy; tongue—dry and coated; spleen and liver—not palpable below the costal margin. Soft systolic murmur present in the pulmonary area. There was a slight cough and there were a few moist sounds in the left side of the chest.

Stool—no cysts seen; ova of round-worm present.

Urine—nothing abnormal.

Blood—no malaria parasites seen.

Hæmoglobin—15 per cent (Tallquist).

Red corpuscles—735,000 per c.mm.

White corpuscles—2,812 per c.mm.

Polymorphonuclears—26.0 per cent.

Lymphocytes—61.6 per cent.

Large mononuclears—10.0 per cent.

Myelocytes—2.0 per cent.

Eosinophiles—0.4 per cent.

1st September. Fractional gastric contents test with a Ryle's tube, after an alcoholic treatment, showed no free hydrochloric acid.

4th September. Van den Bergh test—direct and indirect negative.

6th September. 'Hepatex' P. A. F. 5 c.cm. injected intravenously.

8th September. Red corpuscles, 535,000 per c.mm.
White corpuscles, 2,150 per c.mm.
Polymorphonuclears, 40.0 per cent.
Lymphocytes, 58.4 per cent.
Large mononuclears, 1.6 per cent.

Arneth count

I	II	III	IV	V
40	38	17	5	0

Three normoblasts were seen while counting 250 white cells; a few polychromasic red cells were seen. The red cells showed slight anisocytosis and almost no poikilocytosis.

The patient ran an irregular temperature while in hospital and died on the 8th September. No post-mortem examination was allowed.

Discussion.—The only disease with which this can be confused is acute infectious anæmia, where hæmolytic occurs. The man was however working up to the day of his admission; the blood count was extremely low and the usual signs of blood regeneration were absent on the first count. There was also an absence of anisocytosis and poikilocytosis and the van den Bergh test was negative, there was no evidence of increased blood destruction. The total counts were still lower on the day of the second count but a diagnostic difficulty is introduced by the presence of a higher percentage of neutrophils in the differential count, shift of the Arneth index to the left and the presence of a few normoblasts and polychromasic red cells. The normoblasts and polychromasia are probably explained by the injection of 'Hepatex' on the 6th September. Pincy (1927) says that 'the greater part of the marrow of all the bones is aplastic but some areas of practically normal marrow may remain'. Liver has the property of producing even in a normal person a condition like erythræmia (Ordway and Gorham, 1930) so probably the liver extract stimulated the remnants of healthy marrow to produce the reticulocytes, polychromasic cells and normoblasts. The change in the neutrophils was probably due to sepsis, which was the cause of the fever and which was not definitely localized. Unfortunately the blood was not cultured.

Colonel J. L. Sen, I.M.S., the superintendent of the School, has kindly permitted me to publish these notes.

REFERENCES

Ordway and Gorham (1930). *Oxford Monographs on Diagnosis and Treatment*. Vol. IX. Oxford University Press, New York.

Pincy, A. (1927). *Recent Advances in Hæmatology*. J. and A. Churchill, London.

[Note.—In view of the complete 'achlorhydria' and the left-handed shift in the Arneth count, and in the absence of any information regarding the reticulocyte count or the red-cell diameters, we feel that the diagnosis in this case was not based on very strong evidence.—EDITOR, I. M. G.]

TREATMENT OF MYIASIS

By B. R. GARG, L.M.P.

Muzaffarnagar

J. L., HINDU MALE, aged 65, consulted me for a putrid sore on the back of the hand, wrist and forearm. The whole of the lower arm from the tips of the fingers up to the elbow was cedematous and swollen. The skin had peeled off at several spots and the wound looked gangrenous, it was full of fly larvæ, which were burrowing deeply into the muscles.

The wound was washed well with a lotion of crysol 1 in 20; undiluted crysol was put into it and it was covered with a dressing moistened with a lotion of crysol 1 in 20. Next day when the dressing was removed more than 100 dead larvæ were disclosed; the condition of the wound was better and pain was much less than before. The same treatment was continued and all the larvæ disappeared by the fifth day. Crysol 1 in 20 was continued as a dressing for three weeks, by which time the wound was healed.

2. Y. S., Hindu male, aged 27, came for treatment and myiasis of the nasal cavity and the soft palate was discovered. His palate had already perforated. I first tried chloroform, and there were no signs of improvement after twenty-four hours, so his nasal cavity was irrigated with a crysol solution 1 in 20 and crysol was applied to the wound in the soft palate. He made rapid progress, ejecting every day a large number of dead larvæ, and was completely cured within twelve days.

3. L. S., Hindu boy, aged 12 years, had a wound in the external ear. The boy had suffered from suppuration of the ear for a number of months; this was treated with hydrogen peroxide which cleaned it up temporarily. But having neglected the ear for some time it became infected with fly larvæ. The cavity was syringed with crysol 1 in 20 twice daily, and crysol 1 in 4 in glycerine was dropped into the ear and the boy was cured within a week.

It is probable that any of the coal-tar disinfectants would be as effective as crysol.

[Note.—We are informed that crysol is a disinfectant prepared by a firm of chemical manufacturers in Delhi.—EDITOR, I. M. G.]

NAGA SORE IN RAJKOT (KATHIAWAR)

By T. H. TRIVEDI, D.T.M. (Cal.)

In Charge West Hospital Laboratory, Rajkot

A boy presented himself for treatment at the above hospital with ulcers on his legs that had the typical appearance of Naga sores.

The boy gave a history that the lesions began as small pustules which ruptured and afterwards had spread until the condition shown in the photographs was presented.

Diagnosis was confirmed by finding fusiform bacilli and spirochaetes in the discharge.

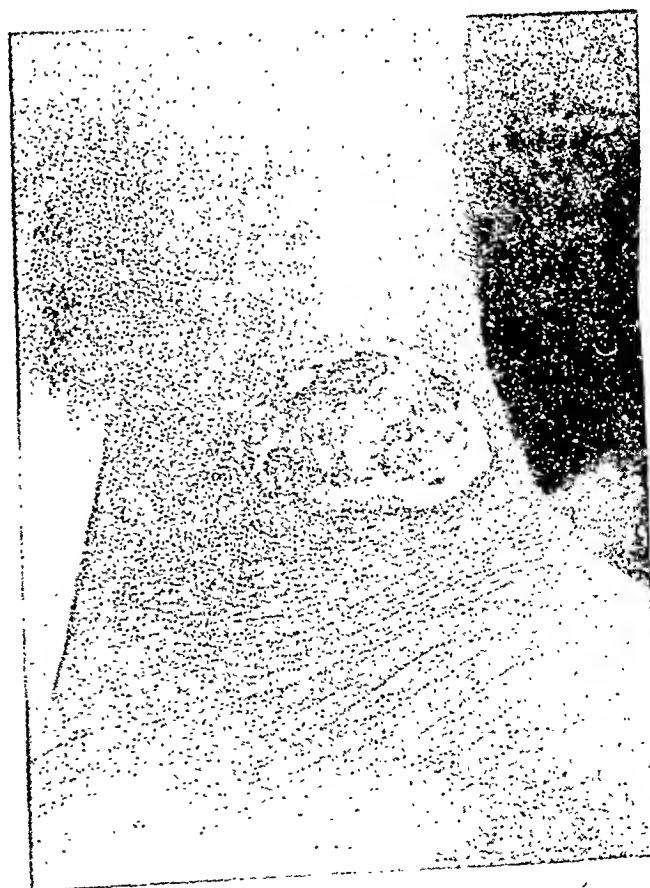
Treatment.—Under the treatment recommended by Lieutenant-Colonel Acton, at the Calcutta School of Tropical Medicine, these ulcers healed satisfactorily.

The treatment consisted of syringing with hydrogen peroxide to remove the sloughs followed by a bath of weak potassium permanganate solution for half an hour, and a dressing of hypertonic saline solution. This treatment was performed daily until healthy granulation tissue had formed when a dressing of boro-vaseline was employed.

Inquiry revealed the fact that this boy was born in Rajkot, was an inmate of the Rajkot orphanage, and never had been out of the district. As far as the writer is aware this condition has never before been recorded in this part

of India, it usually being looked upon as only endemic in the more humid parts of the country.

I wish to thank Major Vance, I.M.S., and the chief medical officer, Western India States hospital, for permission to publish these notes.



Indian Medical Gazette

MARCH

THE THERAPEUTICS OF MALARIA

THE Third General Report of the Malaria Commission of the Health Organization of the League of Nations, on the therapeutics of malaria, is a document of such first class importance that we need make no excuses for reprinting considerable portions of it in our Current Topics section this month. The whole report covers over a hundred pages of the *Quarterly Bulletin of the Health Organization*,* and it should be read *in extenso* by all public-health officers in malarious countries as well as by all those who make any special study of the mass or individual treatment of malaria.

The therapeutics of malaria is such a many-sided subject that it would have been impossible to do full justice to all its aspects in a report even of this length. The economic aspect, the most important from the point of view of India, has not been entirely neglected, but has not received the attention we should have expected; this aspect, which is inevitably associated with the total-cinchona-alkaloids problem, we will leave for later discussion.

The principal impression which the reading of this report gives is that our knowledge on every aspect of the problem of the treatment of malaria is most surprisingly indefinite, and it can be said that the principal thing the authors have achieved is an accurate definition of the limitations of this knowledge.

The last chapter, the summary and conclusions, of this report is a masterpiece of clarity and precision. One of the principal points made is that there is no 'standard treatment for malaria'; a form of treatment that is adequate for one species of malarial parasite is not adequate for another species, or even for another strain of the same species; the course of treatment that should be given for a primary attack is not necessarily the course that should be given for a relapse, or a recurrence; and the tactics that one would adopt to deal with malaria in one affected population might be quite wrong if applied in another. That is to say the treatment of malaria is far from a simple problem, and it cannot be reduced to the matter of a fool-proof formula, or even of a number of formulæ. The commission are not prepared to make any specific recommendations; they lay down guiding principles only, and leave it to

each country and district to work out the solution to its own special problem. This, it might be said, is not very helpful; but in actual fact it is, and a reference to the report, or even to the extracts that we have given in this number, should satisfy the reader on this point.

The aims of treatment of malaria can be considered under five separate headings; each of these aims is quite distinct from the others, and much confused thinking (and writing) would be avoided if this could always be remembered. We will consider these one by one.

(a) *The destruction of the sporozoite infected by the mosquito before it establishes itself in the body cells of the host; that is to say, 'true causal prophylaxis'.*

At the present time there is no drug, given in non-toxic doses, that will achieve this. For many years it has been recognized that quinine was useless for this purpose, and evidence has recently been produced to show that atebirin also fails; with plasmochin in truly toxic doses an apparent success has been achieved, but failures have been reported with doses as large as 0.06 gramme per day, a dose that will cause symptoms in quite an appreciable percentage of the people who take it.

(b) *The maintenance of the infection at a sub-clinical level; that is to say, 'clinical prophylaxis'.*

This can only be achieved by continuous dosage over a long period; for this the commission recommend quinine in six-grain (0.4 gramme) daily doses to be taken the whole time the subject is exposed to infection and for some months afterwards. This recommendation is based on an extensive clinical trial with people who have acquired a degree of immunity. In the controlled experiments with non-immune subjects, it was found that a dose of five grains of quinine daily did not prevent a clinical attack of malaria, but caused a modification of this attack. On the other hand they report parallel experiments with atebirin which show that a dose of one grain daily will maintain clinical prophylaxis, but this is not, any more than quinine, a true prophylactic because when the drug is discontinued the patient will eventually get an attack of malaria. The reason that they do not recommend atebirin instead of quinine in this capacity is apparently because there is as yet no evidence to show that the former is harmless when taken for long periods, and because it is liable to cause, even in this small dose, a slight discoloration of the skin and conjunctivæ. Time will very shortly supply this information, as most people find this daily dosage with quinine very trying and many will undoubtedly substitute atebirin. Plasmochin is not recommended as, to be effective, it has to be taken in doses bordering on the toxic limit; this it would be unwise to continue for long periods.

*The fact that we are only now commenting on this report seems to call for some explanation. Our copy of the number of the *Quarterly Bulletin* in which this appeared went astray in the post; this we only realized when we received the next number.

(c) *Destruction of the parasites in the fully-developed early schizogony cycle; that is to say, the treatment of the malarial attack:*

Here the commission are rather more prepared to be definite about what must not be done than about what must be done. What one must not do is to give a very vigorous and long-continued course of treatment in an attempt to deliver a knock-out blow to the infection at this stage. The reason why this must not be attempted is because it cannot be done. A moderate dose given over a short period will produce as good an effect as a large dose over a longer period; the excess is not only wasted but, to continue our metaphor, glances off and is liable to knock out the resistance of the patient. This is perhaps one of the most important points that the commission makes; they emphasize that no drug will cure malaria unaided and that we always depend to a certain extent on the natural resistance of the patient, and that if we can tide the patient over this first attack with as little assistance as possible, the more will his natural resistance be raised and the better will he be able to deal with relapses or recurrences. Opinion has been for some time tending in this direction and the support given to it in this report should go a long way to end the 'big stick' methods that have been adopted in the treatment of malaria. The commission will not accept the responsibility of recommending to the exclusion of the other either atabrin or quinine for the treatment of the attack of benign tertian malaria; both they say are equally good. They do, however, give definite preference to atabrin* in the treatment of malignant tertian, but not of course to the complete exclusion of quinine, which, they admit, is a very valuable drug even in this infection. But they are quite definite in their assertion that on no account should the treatment of the primary attack be prolonged for more than seven days, and they appear to favour a five-day course. Again they do not think that plasmochin has any place in the treatment of the disease at this stage.

(d) *The destruction of the parasite in its latent stage; that is to say the prevention of relapses and recurrences.*

The commission are particularly discouraging in their recommendations here. They say that there is no drug, be it given in doses ever so large, that will prevent a relapse of benign tertian malaria with certainty and they take the defeatist attitude that it is therefore no use trying. Their recommendation practically amounts to treating the relapses and recurrences when they arise. With regard to malignant tertian they suggest that, as it does not appear

to be so difficult to bring about sterilization, this might be attempted. Except that they say that this preventive course should not be commenced until at least a week has elapsed since the completion of the treatment of the attack, their suggestions as to how this sterilization is to be achieved are not very explicit, nor do they seem to make it clear how the procedure differs radically from that adopted with regard to benign tertian or quartan malaria. We have for this reason given the summary of this subsection in full:

In support of the suggestion that a better result will be obtained, if, when quinine has been given in the first attack atabrin be given in the relapse and *vice versa*, no evidence is quoted; it sounds a reasonable suggestion but one would like to know that it was not a guess.

They do not consider that the evidence at present available is sufficient to justify the conclusion that plasmochin alone, or plasmochin plus quinine, is better than quinine alone, as a relapse-preventing drug.

(c) *The destruction of gametocytes, to eliminate the source of infection of mosquitoes, as an antimalarial measure in a community.*

This the commission appear to consider the only legitimate use for plasmochin; they suggest that it be given twice a week. In this connection they draw attention to the fact that recent experience has shown that there is no justification for the assumption that treatment tends to raise the number of gametocytes, or that these are evidence of increased immunity; on the contrary, it is pointed out that the higher the immunity the lower the number of gametocytes. There are fewer gametocytes in relapses than in the primary attack, and they are many times more common in young children with their low immunity than in adults. The moral of this is that if anti-gametocyte measures are to be adopted great care must be taken that all children are treated, as missing one child may be of far greater importance than missing a score of adults.

The foregoing summarizes the recommendations of the commission but there are many other points raised that will certainly stimulate discussion. A very interesting observation, to which they have drawn particular attention, is the appearance of late relapses, or 'recurrences' as they call them for convenience. These occur between the seventh and tenth months after the primary attack and in benign tertian are more frequent than the early 'relapses' that occur after ten days but within two months. They do not give any explanation of this phenomenon. [One that suggests itself is that in the first attack the 'immunity' of the patient, induced by the attack and perhaps aided by the drug given, destroys most of the parasites in the blood in that attack, and is sufficient to keep the infection at a sub-clinical level so that the next attack, which would normally

* We find this difficult to understand in India where quinine acts so effectively in this infection; one hopes that the claim is not dependent on James' few observations with the quinine-resistant Rome strain of *P. falciparum*.

occur when the parasites had multiplied sufficiently, will abort, but the immunity of the patient is further raised during this process and is now sufficient to keep the infection at its latent level for some considerable time. It is probable that this immunity is not permanent, and at the end of nine months has fallen low enough to allow the malarial parasites to multiply and cause another attack. This 'recurrence' will probably raise the immunity to a much higher level. But is there any guarantee that even this has completely destroyed the malarial parasites and that the malaria will not recur in these cases after perhaps 18 months or an even longer interval on this occasion? At this early date it can scarcely be claimed that this assumption is based on experience.] These 'recurrences' have not been recognized clinically, as such, in tropical countries; this, it will be affirmed, is because they have always been labelled as fresh attacks. This explanation would only hold if they were rare, and one is driven to the conclusion that they are mainly phenomena of the primary attack. Sinton and his colleagues selected two months, partly for convenience but mainly from the practical experience that relapses or recurrences seldom occurred after this date; they may not have followed up their patients individually, but, as their patients were soldiers, the fact would certainly have come to their notice had many relapses occurred at a later date; it therefore seems quite probable that in this class of patient these late recurrences are rare, and that it is justifiable to ignore them in testing the *relative* relapse-preventing properties of a drug or combination of drugs.

A criticism that we feel we must make is that throughout the whole report the extreme caution with which the observations of very reliable workers in malarious countries are accepted appears in very marked contrast to the ready accord given to dogmatic conclusions apparently based on a few controlled experiments in England and other non-malarious countries. It must not be thought that we underestimate the importance of these controlled, pseudo-natural experiments. They have provided us with facts and figures regarding the course of the disease and its therapeutics that otherwise it would have been impossible to obtain and they have not only given a badly-needed stimulus to the whole subject of malaria therapeutics but have led to a tremendous advance in our knowledge of the whole subject. From these experiments we can make deductions regarding the relative action of drugs under field conditions, but it must be remembered that at the best they are only one stage removed from laboratory experiments and that conclusions based on them are only directly applicable to one particular set of conditions, namely, that of the well-fed, bodily-healthy European spending a short time in a malarious country. This particular aspect of the problem represents

a small fraction of the whole malaria problem that has to be faced.

It is admittedly exceptional for conditions to occur which allow treatment experiments to be conducted actually in tropical countries, but now and then such opportunities do arise. Acton's experiments in 1919 at Dagshai and the similar experiments at Kasauli carried on by Sinton and his colleagues are examples; these experiments are admittedly open to certain criticisms and the results obtained are not capable of universal application, but at least they represented an actual problem and moreover a problem which now appears to have been solved; the 'relapsing' soldier has become so rare that this work has had to be given up. The general impression, which of course may be wrong, is that this has been brought about by the use of plasmochin *plus* quinine.

Sinton and Bird's experiment with this combination, in which they had only three relapses in thirty-six cases as compared with the usual relapse rate of 70 per cent that they had been getting with quinine alone, was very significant from a mathematical standpoint; this work was mentioned, but not taken into consideration in drawing the conclusion, apparently because the cases were not followed up for a sufficiently long time to exclude possible 'recurrences', which we have no reason to suppose are common in patients of this class.

The commission claim that it is paradoxical to assume that the giving of two drugs, one of which is not a specific and does not combine with the other to form a new compound in the stomach, may effect a higher cure rate than the giving of the specific alone. With this we cannot agree; there are many examples in therapeutics of the combined action of two drugs differing from the sum of their separate actions. Whether any benefit is derived from combining the use of alkalies and quinine we are not prepared to affirm, but it is certainly not paradoxical to assume the possibility.

The suggestion that moderation should be exercised in treating the primary attack and the early relapses, and that the less treatment that is given without endangering the life (or, one presumes, sacrificing the comfort) of the patient, the greater will be the resistance to future relapses, or even fresh infections, is, we feel sure, very sound, and as we have said one of the most important recommendations of the commission, but even this suggestion will not bear following to its logical conclusion. For it would mean that the indigenous inhabitants of malarious countries, many of whom have little or no quinine all their lives, should be healthy, malaria-resistant people, the weaklings having all been killed off and the rest having acquired a natural immunity. This is not the usual picture of malaria-ridden populations, though it may be true of a few. There must be some other factor. Perhaps we are wasting our time over this treatment problem and possibly it is

this other factor that we should be looking for! In any case we feel certain that experimentation will have to be carried beyond the walls of mental hospitals in Europe and America, if we

are to find the solution to the problem of the relief of malaria-stricken populations, those of the Roman Campagna and of Bengal, for example.

Special Article

FRACTURE EQUIPMENT: WITH NOTES ON ITS USE

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Part II

AMBULATORY APPLIANCES

BONES of the lower limb, like those of the spinal column, require longer periods of abstention from full functional use after fracture than other bones of the body. In addition to the other functions of bone they have to carry the weight of the body during a great part of the day. In the case of the femur, particularly if the line of fracture has been oblique, continuous weight-bearing before the callus has sufficiently consolidated, will result in a gradual slide of the fragments. The ultimate shortening may be $\frac{1}{2}$ to $\frac{3}{4}$ inches more than when the patient left his bed. Apart from this, if the patient can get about without allowing the weight to bear on the broken bone, not only do we diminish the burden of attendance and nursing at an early stage, but we hasten healing by improving the patient's circulation and general condition. We can go even further than this; by suitable walking appliances it is possible to treat patients with lower-limb fractures as out-patients, or allow them to return to their head-quarter stations for considerable periods. Finally, the lot of those unfortunate patients with open fractures which have developed a low-grade osteomyelitis can be considerably ameliorated and the nutrition of the parts improved by getting them out of bed. Sinuses tend to heal and the tenderness of the callus diminishes more rapidly than when the patient is confined to bed. The economic gain is considerable.

Two such appliances have been included in the standard scale recommended by me in part I of this paper (p. 35). These are shown in figures 22 to 26, with full details for making them. Figure 25 is an outline drawing showing the method of application with plaster of a walking stirrup iron for lesions below the knee. The vertical rods of the stirrup should be in the axis of the limb. If they lie with an angle to the axis opening either forwards or backwards the patient will not be able to walk in comfort. The upper end of the plaster should be well moulded under the tuberosities of the tibia and the head of the fibula. It is advisable to use a wool bandage under the

plaster until experience has been gained in the use of plaster. A non-padded plaster cast is lighter and maintains the fragments in better fixation. The loop of the iron is adjusted about $1\frac{1}{2}$ to 2 inches below the sole of the foot. The bandage should be crossed around the vertical supports, as shown in the diagram, to ensure fixation. If this is not done a back and forth looseness soon develops. Such a plaster properly applied *will last for weeks* while the patient gets about. The position of the fragments can be checked by x-ray through the plaster. If the position is bad the splint should be reapplied.

All patients with fractures of the femur should be made to use a walking caliper up to a period of 4 to 6 months from the date of injury. An adjustable caliper is shown on page 153. A thigh strap and an ankle strap pass through the loops provided on the side rods. The ankle strap should be firm so as to prevent the limbs of the caliper from springing apart and allowing the lugs to escape from the holes in the heel of the boot. Indians who do not wear boots should be provided with wooden sandals the soles of which are $1\frac{1}{2}$ inches thick. These may be bandaged to the foot. Some patients learn to use the caliper in a very short time. Others may require half-an-hour's lesson with two attendants, twice daily for a week. I had an old lady who twice fractured her femur at an interval of two years. On both occasions she used this caliper and could easily walk to church on it, a distance of half a mile, unaided, besides doing her usual constitutional each day. The patient learns to sit on the inner part of the ring at each step, using the tuber ischii to bear the weight of the body while the sound leg is swung forward. A shoulder strap passing over the sound side may be necessary to keep the ring up. It can be fashioned from stout calico. Some patients prefer to hold the outer side of the ring with the hand of the injured side.

During the past six months I have used the walking stirrup iron in the following fractures. Severe Pott's fracture, fracture of the fibula, fractures of the metatarsal bones, fracture of the internal malleolus, fracture of both bones of the leg, and also in the case of a patient, with an old open fracture of the tibia and a sinus, who had been confined to bed for several months before I saw him. In all these cases the patients were allowed up and about the day after the application of the plaster.

BRAUN'S SPLINT

Originally devised as a fixation apparatus for the ambulatory treatment of tuberculous knees, Thomas' splint depends for its success as a fracture appliance on two factors, namely support and extension. If both these factors are properly exercised it has no rival as an ambulatory appliance for transport in the case of fractures of long bones. No single appliance in fracture equipment has stood the test of war and post-war experience so successfully in this respect.

Support is obtained on the sling principle by strips of material passed over and attached to the side rods. Extension is less simple. The traction rod from the foot is passed over or fixed to the cross rod at the end of the splint. The force applied is thus transmitted to the padded ring which abuts against the tuber ischii. The stronger the force applied to the end of the splint the greater the pressure of the ring on the tuber so that the limb is kept taut between these two points. Reduced to its simplest analogy the limb takes the part of a bow-string while the splint is the bow. If this analogy is disturbed in any way the principles of the splint are interfered with, so far as extension is concerned, and it loses some of its value.

I am aware that this might sound terrible heresy to those who are devoted to Thomas' splint under any circumstances. However, consider the question further; in those cases where Thomas' splint is used as a permanent appliance in the treatment of fractures of the long bones, we often see the traction cord carried beyond the end of the splint without attachment to it, and run over a pulley on an independent support or Balkan appliance. The immediate effect of this is to abandon the intrinsic extension feature of the appliance and to use it merely as a means of support. If the traction cord is not allowed to act on the end of the splint no counter pressure reaches the tuber and the analogy of the bow is lost. In all these cases the manipulator finds that the foot of the bed must be raised to provide counter extension by the weight of the body.

Used merely as a means of support without intrinsic extension Thomas' splint has certain disadvantages. If the tuber ischii is not used as a pressure point the large padded ring is an encumbrance. It interferes with the use of the bottle and the bed pan and in hot weather is insanitary owing to the leather covering. Its circular shape also allows rotation of the appliance in its long axis. A half-ring type has been evolved, but does not entirely meet these objections. Illustrations in textbooks and journals show various devices to overcome the rocking of the splint on its long axis. The patient may constantly require adjustment of the splint and rest is impaired. The nurse or attendant needs to be possessed of unusual 'splint instinct' to make a fidgety patient comfortable. Suspension

cords from the ring and from the side rods are sometimes carried over pulleys attached to the suspension beam overhead. This increases the complexity of the apparatus. In some cases the end of the splint is secured to the vertical support of the Balkan beam at the foot of the bed. This is mechanically unsound as it fixes only one end of a long splint, and since the fixation is in the line of the long axis of the splint it does not completely control the rocking movement. In cases where direct extension from the knee is used by means of tongs or calipers an additional knee-flexion piece is essential, if the leg is to be removed from the line of traction. On the other hand, if extension is made by means of adhesive of any kind, the knee must be kept straight with the danger of stiffness of that joint or relaxation of the ligaments. Movements of the knee cannot easily be carried out without interference with the extension. If this splint is used for the treatment of fractures below the knee joint, the knee must perforce be kept extended. This is an unsound posture for such fractures, as the muscles which cross the knee joint posteriorly are not relaxed. Good reposition is not possible in fractures of the tibia if the tendo Achilles is not relaxed.

All these disadvantages are overcome in the skeleton type of supporting splint, named after Braun, without in any way losing the advantage of support by soft material which is a feature of skeleton splinting. It is this type of splint which is used almost exclusively by Böhler for the lower limb, and it is the most popular type of skeleton splint in use in Germany, Austria, and Switzerland. In appearance except for minor differences it is not unlike the skeleton cradle splints designed and made in Egypt during the war by Professor Hey Groves for use in our army hospitals. I had the good fortune a few years ago to observe Braun's splint in use at the Workmen's Accident Hospital, Vienna, on 14 patients, over a period of several weeks, and was struck with the obvious comfort they enjoyed. I was present at the admission of several femur cases, so that I was able to follow the treatment from its inception.

Outline drawings illustrating this splint in use for both intrinsic and extrinsic traction were given in part I of this paper, page 36, figures 13 to 15, and a detailed diagram of an adjustable model is given on page 36, figure 12. I have to thank Mr. Sharpe, D.C.M.E., for his help in this matter. For a full description of its use the reader should consult Professor Böhler's book; little difficulty will be experienced with it.

It will be easily seen that Braun's splint is stable, and allows the knee to remain in flexion, with the leg and thigh in the most suitable position for the application of extension either directly from the bone or by adhesive on the skin. No suspension cords are required to steady it, and the support which is sometimes used with a Thomas' splint is incorporated in

the splint. The large padded and, in my opinion, unnecessary ring is absent. Extension may be by intrinsic traction in the case of fractures below the knee. In extrinsic traction the weight of the body acts counter to the applied weights by elevation of the foot of the bed. The principle of the double-inclined plane, so essential in many fractures of the leg and thigh where relaxation of the tendo Achilles must be secured, is clearly applied, and permits direct extension from the knee without any additional leg flexion piece. For direct extension from the heel nothing could be simpler than the pulley arrangement which forms part of the splint.

One such splint has been allotted to each district hospital in the proposed standard scale (part I, page 35). It is cheap, and easier to make than a 'Thomas' splint as it does not require the services of a cobbler or upholsterer to make a padded ring. There is one important feature which needs stressing. In a 'Thomas' splint the slings are allowed to sag in a semi-circle to hold the limb; in using a Braun splint it is necessary to have these slings taut. The material should be applied in a continuous bandage across the side rods so as to form a firm but resilient bed for the limb.

EXTENSION AND TRACTION APPLIANCES

Manipulative reduction of fractures is another way of expressing the mysterious procedure known to the layman as 'setting' a fracture. The modern surgeon avoids manipulation as much as possible. If a piece of wood is broken across and we wish to fit the splintered ends nicely together we draw the fragments apart and then approximate them in the line of their long axes. The jagged ends will then interlock neatly. Manipulation to force the splintered ends into position without drawing them apart will only disarrange the fragmented ends and increase the damage before re-alignment is secured. This principle should be applied as often as possible in fractures. Deliberate, steady, adequate and sustained traction should be made in the direction of the upper fragment until the broken ends can be made to resume their proper positions with respect to each other. The extension is maintained until a suitable fixation appliance is attached to the limb. If the extension is removed before this is done the displacement may recur.

The tendency to use fixed frames with screw traction to reduce displacements before fixing the limb in a cast or other form of splint is increasing. Hawley's fracture table is an example of this kind of frame that can be adapted for every part of the body. Bohler has a special frame for each extremity. If all fractures occurring on a railway were concentrated at one centre, it would be possible to bring such apparatus into regular use, and to expect the development of the necessary skill among special members of our staff. The

number of fractures occurring in each district, however, is not large enough to justify the issue of an appliance, such as the Hawley table, to each district hospital, and I do not believe that the standard of fracture treatment at present warrants the heavy outlay. To my mind the demand for these specialized items should come from the districts and the will to use them will in due time provide justification for their supply. Nevertheless, I am convinced, both from personal experience and from post-graduate observation in Europe, that some form of traction appliance is essential in certain cases. I do not think it is possible to set up the lower limb properly in plaster for injuries near the hip, without its aid.

To apply this principle of continuous traction in the case of fractures of the lower limb, a perineal pillar with supporting bracket for the sacrum is necessary. The apparatus is illustrated on pages 153 and 155. The pillar must in all cases be firmly padded to the thickness of about two inches with wool and bandage to avoid injury to the urethra. In cases where the traction rods illustrated in figure 30 are not available two assistants are necessary. The pillar and bracket are clamped to the lower end of the operation table, and the patient raised about six inches by means of a box for the head and shoulders, and the bracket for the sacrum. The legs are extended by the assistants each holding an ankle. Two tables or stools of suitable height are provided for the elbows of the assistants so that they can continue traction without undue fatigue. The operator is now free to assist by pressure on the great trochanter in cases of fracture of the hip. As slow abduction with extension is made it may be possible for him to feel the fractured end of the lower fragment disengage and slip down over the upper margin of the rim of the acetabulum. The reduction can then be checked by measurements, and the plaster applied while the correct position is maintained. Where screw traction rods are available, as shown in figures 27 and 30, the extension is steadily increased by the screws and the exact value of the pull can be read off if a Salter's balance is interposed between the foot and the screw pillar.

By modifying the position of the patient with reference to the perineal pillar it is possible to use this appliance for fractures below the knee and for the upper limb. Where continuous traction by means of weights and a Thomas or Braun splint is used, such an apparatus is not essential, but it is indispensable for high fractures of the femur which are to be treated in plaster.

I am indebted to Mr. H. Mullineux, A.E.E., Jhansi, for his assistance in the design and construction of the traction appliance for the lower extremity.

It is unreasonable to suppose that no additional damage to the bone is done by forcible

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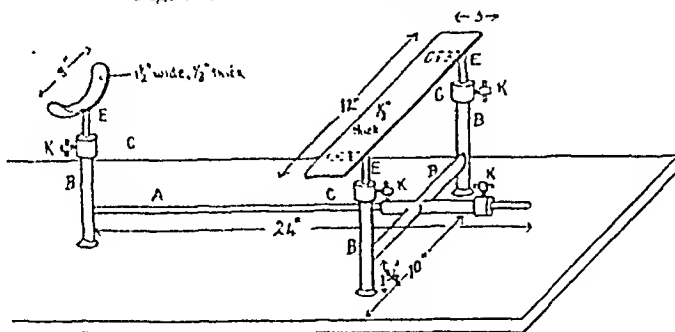
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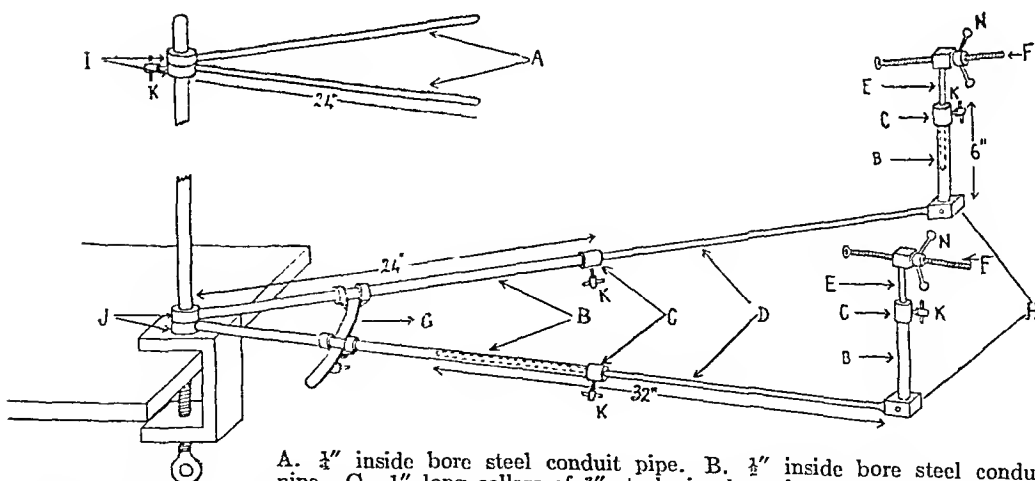
EXTENSION APPLIANCES.

Fig. 29.—Head and shoulder rest.



A. $\frac{1}{2}$ " bore steel conduit piping. Where shown joined joints to be braced. B. $\frac{1}{2}$ " bore conduit steel pipe. C. 1" long collars of $\frac{3}{4}$ " steel pipe braced on. E. Mild steel rod to fit B. K. $\frac{3}{4}$ " clamp screws with T rods. L and M. $\frac{1}{4}$ " iron sheet cut to dimensions given in sketch. All parts marked B to be finished in enamel white. Other parts nicked or oxidized. (Note.—This piece of apparatus is a later modification of that shown in figure 27; the difference is only in detail.)

Fig. 30.—Traction rods (not to scale).



A. $\frac{1}{2}$ " inside bore steel conduit pipe. B. $\frac{1}{2}$ " inside bore steel conduit pipe. C. 1" long collars of $\frac{3}{4}$ " steel pipe brased on. D. Tool steel rod to take F loosely. E. $1\frac{1}{2} \times 1 \times 9$ " mild steel machined to fit B with square block at top end 10" radius and 16" arc. F. Mild steel with $\frac{3}{4}$ " shaft threaded 11 to 1". G. Brass sector $\frac{5}{8} \times \frac{1}{4}$, $\frac{5}{16} \times 1\frac{1}{4} \times 1$ ". I. Steel collars $1\frac{1}{2}$ " diameter and $\frac{3}{8}$ " thick. J. Steel collars $1\frac{1}{2}$ " diameter and $1\frac{1}{8}$ " thick to slide as shown on vertical bar. K. Clamp screws $\frac{3}{8}$ " with T-shaped turn rods. N. Blocks with turn rods threaded to fit F.

avoid pressure and irritation where movement occurs. Close inspection of the limb must be enjoined on the ward staff for the first 24 hours. Swelling, blueness and pain are danger signs. If any of these occur the splint must be split immediately. A very mild degree of swelling without pain and with good sub-onyehial circulation however need cause no alarm and will probably disappear with elevation of the limb. After some experience it is possible to apply good moulded splints without any preliminary padding. These are especially useful for lower leg walking irons on account of their smaller bulk and weight.

Before beginning the application of a bandage a basin of thin plaster cream should be made ready. Half to one pint of lukewarm water in a basin is sprinkled on its surface with plaster powder. Lumps should be broken up with the fingers before being dropped into the water. The water is stirred with one hand while the sprinkling is continued until the powder ceases to sink readily below the surface of the water. The consistency of the mixture will then be about that of rich newly-drawn milk or perhaps a trifle thicker. If allowed to be thicker than this it will set before the splint is finished and be of no use for its special purpose. This cream is used for continual smearing of the layers of the bandage as they are applied by the surgeon. As the splint is nearing completion the cream will have set to a sufficiently stiff paste to finish off the ends of the plaster neatly. If the amount of cream is insufficient or has set hard too quickly, a fresh lot must be quickly prepared. It is useless to add more water to plaster which has begun to set in the hope that it can be thinned again. The result will only be a 'lumpy' mess quite unfit for plaster work.

Plaster bandages should be immersed in lukewarm water just before use. Only one bandage should be immersed at a time, a new one being added to the water by the nurse or assistant when the one being applied is nearing its end. Immersion is complete when the bandage ceases to bubble. If immersion is continued much longer the plaster in the bandage will have set and if now used it will be found that the layers of the material will not adhere. Bandages should not be wrung or squeezed before being applied. The better saturated the bandage the more effectively will the plaster set. During the application of the bandage the bowl or basin containing the plaster cream is held under the limb so as to catch the overflow of excess water and suspended plaster. This is reapplied immediately by the assistant.

Care should be taken that the fingers or any adjacent projections on the table or extension apparatus do not cause any indentations in the plaster while it is soft. A skilled assistant holds the limb if necessary with the flat of the hand or by a rubbing motion. Pressure sores will result from indentations due to unskilful handling.

Turns and twists tend to produce a rope effect in the moist bandage and because of the danger of constriction effects should be avoided as much as possible.

When the bandaging is complete the splint will remain soft for some time, according to the state of the weather. Care should be taken that displacement does not occur during this period. Drop foot and drop wrist are very liable to appear after the plaster has hardened if this is neglected. The heel should not be rested on the bed or table until the plaster is hard. The date of application of the plaster should be clearly printed in ink or indelible pencil on the plaster when finished.

Large plasters such as those around the hip or shoulder should be strengthened across the joint lines by strips of Cramer's wire splinting incorporated in the layers of the bandage.

Bivalve or split plasters, if carefully cut, can be eyeletted and hinged with tape along the back of the limb. The edges should be bound with adhesive plaster to prevent fraying and crumbling. Hip abduction plasters may be cut across at the knee and hinged at the back by incorporating a strap hinge. This allows movement and prevents stiffness of the knee. Plasters which pass as high as the waist should be cut low in a curve below the umbilicus to allow free abdominal respiration and to permit of alterations in the girth consequent on changes in the bowel and bladder content. The lateral part of the body plaster on the same side as the injury in these abduction plasters may also be cut low; this permits free expansion of the chest in old people, but does not in any way interfere with the extent of abduction which is controlled by the wall of plaster on the uninjured side.

In all cases it is wise to bear in mind that the trouble of renewing a plaster is to be preferred to the risk of a pressure sore or an ischæmic myotrophy.

Plaster is pervious to x-rays, and radiograms should be taken after application, to ascertain the condition of the bones. If reduction is not good reapply the plaster, if necessary, with the aid of a traction appliance.

In the preparation of bivalve plaster splints, a longitudinal strip of soft metal may be bandaged into the deeper layers of the plaster; this is cut down upon and facilitates the splitting process.

The finishing off at the ends of a plaster is done with an old scalpel with a strong blade. Cream is used to smooth the rough edges. Windows for the dressing of wounds, or to provide 'scratch' apertures, are made in the same way before the plaster has hardened.

It is not necessary that all plasters be made by bandaging the affected part. Moulded splints are useful in certain situations such as the dorsum of the forearm and the back of the leg and thigh. The soaked bandage is passed back and forth on a smooth surface to the required length so as to make a plaster pad

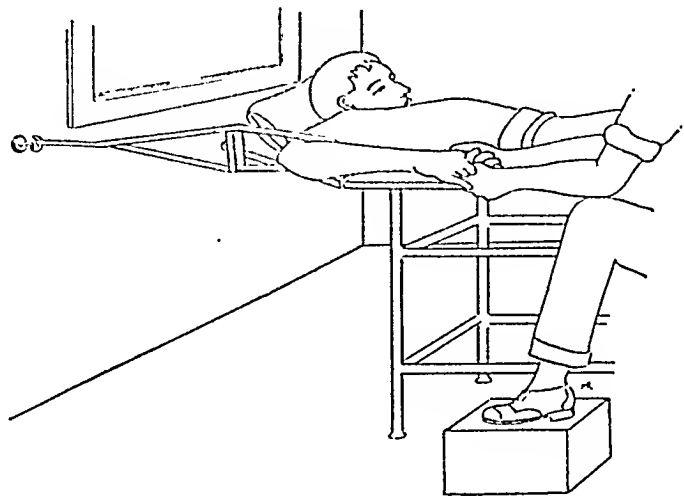


Fig. 31.—Böhler's loop for Colles' and other fractures of the forearm.

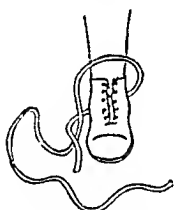
Miscellaneous Items

Fig. 32.



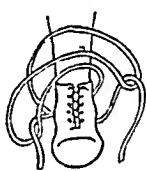
Double loop ankle traction.

Fig. 33.



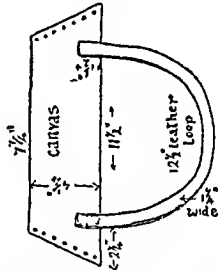
Collins' hitch; first stage.

Fig. 34.



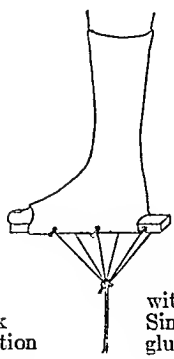
Collins' hitch; complete.

Fig. 35.



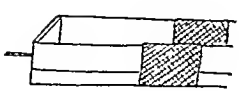
Hessing's anklet; seven eyelet holes; lace from above.

Fig. 36.



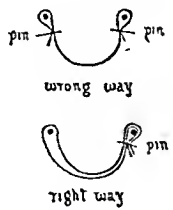
Sock traction with Sinclair's glue.

Fig. 37.



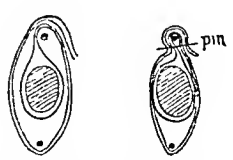
Adhesive plaster stirrup. Note gauze to protect malleoli, etc., from sticking to adhesive. Wood to be 4" by 3" for leg and 3" by 3" for arm. Standard 2" plaster overlapped 1" to make 3" strip.

Fig. 38.



Method of fixing sling supports for the leg in Thomas' splint.

Fig. 39.



Method of fixing support in arm cases with skeleton splints where the side rods are vertically placed one above the other.

three-sixteenths to a quarter of an inch in thickness. The width depends on the width of the part affected. This pad is placed on the affected part while still soft and moulded by pressure. It can be fixed to the part by means of a non-plaster bandage. It will set with a perfect fit to the part. Similar pads may be used for strengthening large plasters. In the manufacture of large shells for the recumbent treatment of spinal injuries considerable sections of the shell may be made in this way with much saving in time.

The removal of a plaster is often a laborious process. Chemical softening agents do not result in much saving of time. Special shears and saw are provided in the standard scale. These instruments should be treated with care in the same way as other surgical instruments and not allowed to lie about as general tools for the use of anyone in the hospital. Plasters which are not required as bivalves or moulded splints after being cut may often be very easily removed by unwinding the bandage if the end is carefully looked for. This method is simpler than cutting.

ANALGESIA IN FRACTURE TREATMENT

Novocaine solution, two per cent, should be used. The technique aims at placing the solution in the hæmatoma around the fractured ends. Fifteen to twenty cubic centimetres are necessary. A total of 50 to 60 c.cm. may be used in multiple injuries in a single case. All instruments must be sterile. The skin is painted with tincture of iodine. The needle should not be touched with the hands, nor should any handling of the plunger occur. The needle should be held by means of a dissecting forceps. The mount of all record pattern needles will be found specially suited for this.

The novocaine should be administered just before the fracture is to be fixed in splints or other means of support. If done as a preliminary to transportation without adequate fixation, or if the limb is allowed to remain unsupported with the patient not under supervision, the displacement may be aggravated and the soft parts damaged by the patient's own movements owing to the remarkable freedom from pain which results. A closed fracture may thus be opened, especially in the leg.

A 10-c.cm. record syringe is necessary. For bones lying at a depth of not more than an inch from the surface a no. 12 hypodermic needle (3 cm.) is satisfactory. For the hip a serum needle of at least 6 cm. is required, to ensure reaching the bone.

The break in the bone is accurately located by palpation, and the needle passed directly down to strike the bone. Five c.cm. is injected and the syringe detached from the needle, leaving the latter in the tissues. In doing this, steady the needle mount with the forceps and not with the fingers. If the hæmatoma has been tapped blood-stained solution will slowly

escape from the needle. The entire 15 to 20 c.cm. may then be injected with perfect confidence that analgesia will be established in the course of a minute or two. If no blood-stained fluid appears from the needle, it should be re-directed after partial withdrawal in a fresh attempt to tap the hæmatoma. Where the hæmatoma is small, as may happen in cases with little or no displacement, it may be impossible to reach it. In such cases two or more injections are made down to the bone from different points on the circumference of the limb so as to encircle the break with solution. This will produce effective analgesia, but has the disadvantage of needing several punctures.

The anaesthesia lasts 2 or 3 hours, but the injection may be repeated if necessary. In the case of open (compound) fractures the needle must be entered from a sound area of skin. There is no closed hæmatoma in such cases so that the solution must be forced into the tissues surrounding the fracture. If the infiltration has been satisfactory, the solution will be found to ooze into the wound as the injection is made. If the solution wells up into the wound the needle is not in the tissues but in direct communication with the surface, and anaesthesia will not result. In such an event the needle must be withdrawn slightly. Two or more injection sites will be necessary to encircle the fracture completely.

After the lapse of a few days from the time of fracture the hæmatoma no longer exists in a fluid state, and diffusion of the solution does not take place effectively and rapidly in the fractured area. Analgesia may nevertheless be obtained by injecting from three or four points round the site of fracture after the manner indicated in cases where the hæmatoma is not located. During the past six months I have used this form of analgesia in the following cases:—The fractures of the neck of the femur, the internal malleolus, the radius, the fibula and a metatarsus, Pott's fracture, Colles' fracture, and dislocation of the elbow.

MISCELLANEOUS ITEMS

Figures 32 to 39 illustrate a number of points in the preparation and application of apparatus for the treatment of fractures; the figures and captions are sufficiently self-explanatory to obviate the necessity for any detailed description.

Fractures of the jaw.—Attention should be directed to the teeth whenever present and the restoration of natural bite or dental occlusion held in view. The surgeon will be well advised in all jaw fractures with displacement to request the help of a dentist. A specially fashioned intraoral splint with dental treatment of dental sepsis is the safest and soundest procedure; no special splint will therefore be found in the scale for jaw cases. I believe that an external splint is of little or no use in any case which

really requires splinting to prevent displacement.

Sinclair's glue.—For the preparation of this the following ingredients are required :—

Glue, carpenter's ordinary	50 parts
Glycerine	2 "
Calcium chloride ..	2 "
Thymol	1 "
Water	50 "

Soak for 12 hours and then melt in a water bath. Store in a wide-mouthed well-corked bottle.

Melt in a basin of hot water when required for use.

Apply with a brush direct to the limb. The strokes of the brush should be against the direction of the growth of the hairs so that they lie opposite to the natural direction when the traction material is applied to the limb. The patient is more comfortable when this is done. The limb need not be shaved. After applying the first layer of traction gauze or other material a second or third layer may be applied after painting more glue on the preceding layer.

The glue will have set sufficiently in 20 minutes and weight may then be applied to the traction stirrup. This glue may also be used for sock and glove traction for the foot and hand.

A glue which does not require heating may be made as follows :—

Resin	50 parts
Alcohol	50 "
Benzine	25 "
Venice turpentine ..	5 "

It should be kept in a well-stoppered bottle to prevent evaporation. If this occurs the skin is liable to irritation with this glue owing to alterations of the proportions of the components.

ADDENDUM

In part I of this paper, which appeared in the January number, the following items were omitted from the standard scale of fracture equipment :—

Balkan beam (as shown in figure 7, page 31), one to each district hospital.

Thomas' abduction arm splint (figure 1, page 31), two to each district hospital and one to each dispensary.

Medical News

PROPOSAL FOR AN INDIAN INSTITUTE FOR MEDICAL RESEARCH

In connection with this proposed institute of medical research, an appeal, from which we have extracted the following paragraphs, has recently been issued.

'Workers in India have been feeling, for some years past, the need for a research institute where original investigations in medical sciences could be carried out and the problems bearing on the promotion of national health could be intensively studied. It is not strange that in India the rate of mortality is so colossal, the average span of life so short and the standard of health generally so much lower than in the countries of the West. A century ago the standard of health in western countries was not much better than that in India now but sanitation and education, backed by organized scientific enquiries into all the problems connected with health, have resulted in a rapid and steady improvement of the health of the people. Scientific research carried on for its own sake as also with the determination of applying it, wherever possible, to the service of the community, is, we feel, necessary for raising the standard of both the health and the efficiency of our people.

It will be generally agreed that very little work has been done on those lines in this country outside the few government institutions, the number of which is inadequate to meet the needs of our country. During the last few years assurances have been received from a number of keen and able workers who are prepared to devote their lives to make this scheme a success. The objects of this institute will be to carry on research in the medical sciences, to train a band of research workers, to apply the knowledge obtained to clinical practice and to preventive medicine, and to disseminate the knowledge of hygiene among the masses, making its services available to them either free or at a low cost.

The intention is to found an institute which will be called "The Indian Institute for Medical Research",

with six departments to start with, namely, (1) bacteriology and pathology, (2) tuberculosis, (3) biochemistry and nutrition, (4) protozoology, (5) experimental pharmacology and indigenous drugs enquiry, and (6) diagnostic laboratory and clinical work, with which the propaganda and preventive service will be incorporated. More sections will be added as soon as sufficient funds are available.

The diagnostic department will be in direct touch with the needs of the people and will try to help institutions, local bodies and medical men with the diagnosis of communicable diseases either free or at a nominal cost and will distribute biological products also at a low cost, if not altogether free. The object of developing this service is to facilitate preventive measures even in very modest homes among all strata of society. It will also be the function of this department to arrange for educative propaganda for the prevention of diseases.

It is desired that the institute shall provide a centre for an increasing band of research workers, who may come in as post-graduate students for whom regular training arrangements are contemplated. The institute may be affiliated to a university and may receive State aid. The institute will also act as a consultative body for the determination of the purity and potency of sera, vaccines and drugs. Indian markets are now flooded with all kinds of adulterated and under-strength products and there is absolutely no way to control or check the purity of medicines and drugs.

The results of its researches will be published periodically in the form of *Transactions* of the institute.

In countries like Europe and America, large donations and endowments are made for this scientific research work, which ultimately does the greatest good to the people. In our country, donations are frequently given for religious endowments. The problem of the health of the people of this country has not attracted the attention of those who could afford to spend money

for charitable purposes. We believe, however, that many in this country are now realizing the necessity for scientific investigation of vital problems of national health. If we succeed in raising the money, this institute for medical research will be the first of its kind in India organized and financed by Indians.

It has been calculated that the initial expenses for starting such an institute will be at least Rs. 1,25,000 for fittings, equipment and first year's current expenses only and a recurring expenditure of at least Rs. 1,10,000 yearly will be required for the six proposed sections. It is hoped, however, that the institute will be self-supporting after the first year. We, therefore, appeal to the generosity of the public only for the initial expenditure necessary to establish the institute and to enable it to function for the first year, namely the sum of Rs. 1,25,000. It is a small premium to pay for the benefits that will accrue, for we would emphasize that improved health means increased longevity and capacity for work, and necessary additions to the national wealth and happiness of the India to come. Notwithstanding these days of depression, we trust that public response will be prompt and generous.

The medical problems that urgently require investigation in this country are so numerous that it would be almost impossible to have too many workers devoting their time to medical research. Hitherto, as the organizers of this appeal say, Indian philanthropists have been more ready to give their money towards hospitals and dispensaries for providing medical relief, the result of whose work, though only affecting a small section of the population, is immediately obvious, than to the organization of medical research which may, and usually does, produce results which, though not so obvious, are more far reaching, more permanent and affect a greater number of persons. Hitherto research organizations, such as the Calcutta School of Tropical Medicine, the Indian Research Fund Association, and the All-India Institute of Hygiene, if not supported by Government, have had to look to Europeans and Americans for their main support; there are of course exceptions as some of the research chairs at the School of Tropical Medicine are endowed entirely by Indians.

However, it has been amply proved by the work of the above-mentioned organizations that a many-fold return may be expected from research work, and with these examples to quote it should not now be difficult to persuade philanthropic Indians that they are likely to see a good return for money which they subscribe.

Care will have to be taken that there is no duplication of work, as the subjects to be taken up by the six proposed sections are already covered by sections operating at the School of Tropical Medicine or shortly to be opened at the All-India Institute of Hygiene, but there should be no real difficulty if the spirit of co-operation which exists between these two institutions spreads to the new institute.

There are, as the instigators of this scheme say, a host of young Indian workers anxious to take up medical research when the opportunity arises. A few years ago the cry was for trained workers, now if a post is advertised there are literally hundreds of applicants of which many have excellent qualifications—not simply letters after their names, but practical experience and good work to their credit; from these it should be possible to select a team of good workers.

Whilst admitting that spacious laboratories and expensive-looking equipment do not ensure the production of useful work, shortage of apparatus and other facilities always lead to a waste of time and will very often seriously detract from the value of the work done. The Rockefeller Foundation spent about Rs. 17,00,000 on building and equipping the Institute of Hygiene and, though it may not be necessary to maintain this high standard, we feel some doubt about the sufficiency of the sum with which it is proposed to establish the new institute, and we cannot help thinking that it would be better to commence with fewer sections and open out as more money becomes available.

We note that there is a suggestion that after the first year the institute will be self-supporting. It does not seem to be made quite clear from where the money is to come, but it is presumably from patients, as fees for laboratory examinations, and from the sale of vaccine, sera, etc. But here care will have to be exercised as vested interests are at stake; private practitioners will consider that patients who can afford to pay should not be withdrawn from them, and established clinical laboratories and manufacturers of biological products may not welcome a new rival. Finally, there is a suggestion that State aid might be sought: but at the present time money is not pouring into the State coffers and the grants to existing institutes have been cut, so that it is unlikely that this hope will materialize—at any rate for some years.

These, however, are difficulties such as always have to be overcome at the inception of any new scheme and we have little doubt that the organizers of this one will see their way, once their scheme develops. The ideal is a very worthy one, and we wish success to its accomplishment.—*Editor, I. M. G.*

NORMAN GAMBLE FUND AND RESEARCH PRIZE

THE Council of the Royal Society of Medicine has accepted, as a trust, the sum of one thousand pounds (£1,000) presented by Mr. Norman Gamble for the purpose of founding 'The Norman Gamble Fund and Research Prize'.

The Norman Gamble Research Prize, value £50, shall be awarded for the best original work in otology completed during the four years previous to the month of October in the year of the award. The competition for this prize shall be open to any British subject, whether lay or medical, who cares to compete, whether or not such persons be holders of or candidates for grants in aid of research.

Grants in aid of research work in otology may be made to any British subject, lay or medical, who may be recommended by the Committee of Award to receive such grants, whether or not such person be a holder of or a candidate for the Norman Gamble Prize. Moreover, such grants may be given either to persons who apply for a grant in order to carry out a specific piece of work, or to selected workers chosen by the Committee of Award to carry out certain specified work of its selection.

Any person to whom a grant in aid of research is made from this Fund shall, within such time as may be allowed by the Committee of Award, render a typewritten or printed report in the English language on the work which has been carried out under the grant, and the Committee of Award shall have the right to publish such reports.

The Committee shall not make any recommendation either for the award of the Norman Gamble Prize or for any grant in research if the papers or work under consideration are not of a sufficiently high standard.

The Committee of Award will consider applications for the prize and for grants in aid of research work in October 1934.

Applications for the prize and for grants in aid must be received by the Secretary of the Royal Society of Medicine, 1, Wimpole Street, London, W.1, not later than 30th September, 1934, and must be in accordance with the regulations stated above.

ALVARENGA PRIZE OF THE COLLEGE OF PHYSICIANS OF PHILADELPHIA

THE College of Physicians of Philadelphia announces that the next award of the Alvarenga Prize, being the income for one year of the bequest of the late Senor Alvarenga, and amounting to about three hundred dollars, will be made on 14th July, 1934, provided that an essay deemed by the Committee of Award to be worthy of the prize shall have been offered.

An essay intended for competition may be upon any subject in medicine, but must be accompanied by a written assurance from the author that it has not appeared previously in print, either in whole or in part, in any form, and has not been presented elsewhere in competition for a prize. The essay should represent an addition to the knowledge and understanding of the subject based either upon original or literary research. It must be typewritten, and in English, acceptable for publication without necessity for editing by the Committee. Any illustrations should be appropriate and correctly annotated with the text. Essays must be received by the Secretary of the College on or before 1st May, 1934.

Each essay must be sent without signature, but must be plainly marked with a motto and be accompanied by a sealed envelope having on its outside the motto of the paper and within the name and address of the author.

It is a condition of competition that the successful essay or a copy of it shall remain in possession of the College; and that it may be published by the author with the consent of the College; other essays will be returned upon application within three months after the award.

The Alvarenga Prize for 1933 has been awarded to Drs. Harry Shay and J. Gershon Cohen of Philadelphia for their essay entitled: 'Experimental Studies in Gastric Physiology in Man'.

MEDICAL ASSOCIATION, COIMBATORE

THE annual dinner of the Coimbatore Medical Association was held in the premises of the new block of the Moses Gnanabharanam Eye Hospital at 8 p.m. on Thursday the 4th December, 1933. After the dinner Dr. Sangameswara Iyer was proposed to the Chair and the report for the concluding year was read by the Secretary, Dr. S. Gurubatham, and adopted. New officers for the coming year were elected—

President: .. Dr. C. N. Anantaranga Rao.
 Vice-President: .. Dr. N. Pratap.
 Secretary: .. Dr. Gurubatham (re-elected).
 Assistant Secretary: Dr. N. Velappan.
 Management: Committee Members:—
 Dr. L. Seshadrinathan.
 Dr. R. Sundararajan.
 Dr. Sangameswaran.
 Dr. K. Narayanan.

The newly-elected President Dr. Anantaranga Rao thanked the members for the honour done to him, discoursed on his long experience in the medical profession, and gave a few words of advice to the young members.

Dr. Sundararajan then put forward a few suggestions, for the better working of the association in the coming years.

Current Topics

The Therapeutics of Malaria: Third General Report of the Malaria Commission

(Abstracted from the *Quarterly Bulletin of the Health Organization of the League of Nations*, June 1933, Vol. II, No. 2)

THE present report appears at a time when knowledge on malaria, after many years of little or no progress, seems again to be advancing. The advance is due chiefly to notable additions to knowledge on the biological aspects of the subject, but the discovery and manufacture of effective synthetic antimalarial remedies gives promise of improving the treatment of the disease and of extending the purposes for which specific drugs can be used. This being so, the Commission has considered it desirable to include under the title 'therapeutics of malaria' the whole range of general and particular aims which practising physicians and public health workers now hope to accomplish by the use of specific antimalarial drugs. But they wish it to be understood quite clearly that, in their opinion, the new synthetic remedies now available are still in the experimental stage, and they consider that the time has not yet come when any of these drugs can be recommended as substitutes for, or in preference to, quinine and other preparations of cinchona bark. The situation to-day may be considered to be analogous in some respects to that which arose after the epoch-making discovery of the mosquito cycle of malaria nearly forty years ago. Now, as then, new knowledge of fundamental importance is available, but we have to learn how it can be applied and utilized effectively in practical antimalarial work. Trustworthy information on the practical application of the new knowledge cannot be obtained quickly, and it is probable that many more discoveries, both biological and chemical, will have to be made before it will be safe to say that the solution of the malaria problem in the world generally is appreciably nearer than of old. What can be said on reviewing the information given in the present report is that additions to knowledge on the

biological side permit the treatment of malaria to be considered in a more rational manner and with greater attention to the past and future history of the case than heretofore, and that the possession of new antimalarial drugs with specific properties different from those of quinine opens the way to some preventive aims which previously could not be realized. These aims—particularly true causal prophylaxis, the prevention of relapses and gametocyte therapy—have been given a prominent place in this report, not because any very striking advance towards their realization can be recorded, but in order that workers may be in a better position to appraise the value of the numerous reports on new remedies which issue like a flood from the medical and lay press. On plasmoquine alone more than 600 articles have already been published and the literature on atebirin seems likely soon to become equally voluminous. It is in these circumstances that this review of the present position of knowledge on the new drugs as well as on quinine and other cinchona alkaloids have been made in the hope that it may be of service to all who are concerned with the therapy and prophylaxis of malaria.

In the first place, the Commission would like to emphasize that, from the medical point of view, the question of competition between natural and synthetic antimalarial remedies does not arise. The treatment of malaria by the physician would not be advanced by producing quinine synthetically or by producing synthetic remedies with an action and toxicity so similar to the action and toxicity of quinine that they could be used only as 'substitutes' for that drug. From the medical point of view, what is required of a new product is that it should be effective for some therapeutic or prophylactic purpose for which quinine is known to fail, and—if it is so—that its use for the particular purpose should involve the patient in no risk of toxic symptoms. The latter is as important as the former.

Having regard to these criteria, the following brief recapitulation of the uses to which available specific remedies are applicable may now be given:

Sporozoite therapy (true causal prophylaxis).—No drug is known which, taken in harmless doses, can be guaranteed to act as a true causal prophylactic.

Clinical prophylaxis.—The Commission is of opinion that quinine is effective for this purpose and that it is the best drug to use. The correct plan is to take a daily dose of 0.4 grm. (6 grains). The daily dose should be taken throughout the period of residence in a malarious area and, to avoid a relapse, for several months after leaving it. Atebrin taken in a daily dose of one tablet (0.1 grm.) is also effective as a clinical prophylactic, but it cannot ordinarily be used for the purpose, as even this small daily dose quickly colours the skin yellow.

Treatment of the attack.—The Commission is of opinion that it is not good practice to treat attacks of malaria in the acute stage with more than one of the specific drugs available. They desire also to state without any qualification that, in their view, plasmoquine should not be used in the treatment of acute attacks of any form of malaria. Thus the choice of specific drugs lies at present between quinine and atebrin. Neither fulfils the requirements of a *therapia sterilisans magna* and the Commission does not consider that, for general use, one of them should be preferred to the other. The great advantage of possessing two curative drugs is that, in cases which seem resistant to treatment with one of them, trial of the other can be made. For the treatment of acute attacks of benign tertian and quartan malaria, quinine and atebrin seem to be about equally effective; but atebrin is definitely superior to quinine for the treatment of acute attacks of malignant tertian (subtertian) malaria. This statement does not imply that good results cannot be obtained with quinine or that it is good practice always to use atebrin instead of quinine for the treatment of acute attacks occurring in patients infected with *P. falciparum*. In connection with this and several other therapeutic questions, the Commission has drawn particular attention to the discovery that the therapeutics of malaria, like every other aspect of the disease, is much more a local and individual problem than has hitherto been thought, and has suggested that workers in different countries throughout the world should endeavour, as soon as possible, to ascertain by carefully controlled experiments what is the comparative susceptibility to quinine and to atebrin of the particular strains of parasite locally prevalent.

The Commission considers that curative doses of quinine or of atebrin for treatment of an attack should not be continued longer than seven days, and that treatment for five days will often suffice.

Treatment to prevent relapses.—No drug or combination of drugs seems yet to be available which will sterilize all the parasites in the human host and thus prevent the possibility of relapse. Neither treatment with quinine alone nor with atebrin alone, nor treatment with either of these in combination with plasmoquine, however intensive or prolonged the treatment may be, can be guaranteed to do so. For this and other reasons which are stated in the report, the Commission does not consider that it is in the best interest of patients to endeavour to combine a plan of treatment designed for the prevention of relapses with a plan having for its object the clinical cure of an acute attack. They believe that treatment designed to prevent relapses should not be begun until at least a week has elapsed since recovery from the acute (primary) attack.

Secondly, the Commission has discussed in the report the problem whether a lower percentage of relapses can be brought about by plasmoquine *plus* quinine than by quinine alone. It was pointed out that, as this mixture does not produce a new compound in the stomach, each drug exerts only its own specific action, and that the doses of plasmoquine which are given with quinine in this method of prophylaxis are smaller than those which exert a specific effect on sporozoites and

trophozoites during the incubation period of the disease or on merozoites and schizonts during the developed attack. This being the case, and it being also known that quinine does not prevent relapses, the proposition that relapses can be reduced by giving ineffective doses of both drugs together is paradoxical. Attention was also drawn to some reports in which the claim is made that a lower percentage of relapses can be brought about by mixing non-specific drugs (e.g., bicarbonate of soda) with quinine than by using quinine alone, and to others in which the reported relapse rate following treatment with plasmoquine *plus* quinine was 100 per cent. It was mentioned also in connection with this subject that the percentage of relapses following any system of specific treatment (and even the percentage following no specific treatment) varies greatly in different countries, in different localities of the same country, and in different individuals. Some of the factors to which these differences may be due were briefly described. It appeared from this account that the problem is one which cannot easily be solved by clinical trials conducted under field conditions in which few of the many factors concerned are known.

For these reasons and having regard also to the cost of particular systems of treatment, the Commission does not at present recommend that a system of treatment with quinine *plus* plasmoquine ('quino-plasmoquine', 'plasmoquine compound', etc.) should be adopted for reducing the incidence of relapses. Having regard, however, to opinions on the subject of 'chemo-therapeutic activation', the Commission would be prepared to review this recommendation if it could be shown by controlled laboratory trials on bird malaria or on monkey malaria, and confirmed by clinical trials under known conditions on induced malaria in man, that it is, in fact, the case that the addition of a non-effective dose of plasmoquine to quinine enhances the action of this specific remedy.

The plan which the Commission favours for preventing relapses of malignant tertian malaria is different from the plan suggested for benign tertian and quartan malaria. This is because they believe that, in cases of malignant tertian malaria, there is a much better prospect of destroying all the parasites present in the system than in infections with the other species. They suggest that, in malignant tertian malaria (*P. falciparum*), when treatment of the primary attack has failed to bring about a permanent cure, the curative course should be repeated in the first recrudescence. Their recommendations regarding the present relapses can be summarized thus:—(1) There is not at our disposal any drug, or any combination of drugs, which can be guaranteed to sterilize all the parasites in the human host and so to prevent the possibility of relapse.

(2) For this reason no good purpose is served by endeavouring to bring about sterilization of all the parasites during the primary attack.

(3) In nature, relapses cease to occur when the defensive mechanism of the human host has acquired sufficient power to overcome the fever and other clinical symptoms which the parasites cause in non-immune persons. The frequency and severity of relapses are dependent chiefly on the amount of defensive power which the infected person possesses naturally or acquires as a result of previous attacks. A scientific method of preventing relapses should be based on this knowledge or should take this knowledge into account by allowing an infected person to acquire as much defensive power as possible. Persons who are treated with large doses of quinine or other specific drug at the first onset of fever in their primary attack and in each relapse get no opportunity of acquiring sufficient defensive power to prevent relapses. Persons who are so treated usually relapse every month for a very long period. During the primary attack, it may not be safe to abstain for a day or two from giving a specific drug, but it is quite safe to do so in the first and any subsequent relapse.

(4) Thus, in a scientific system for the prevention of relapses, no attempt is made to give 'treatment for

the prevention of relapses' during the primary attack. One waits until the first recrudescence and then uses the specific remedies in such a way that they will assist, rather than hinder, the development of the patient's natural defensive forces. By repeating this plan with the same watchfulness during the second recrudescence (using the specific drug at a later period and more sparingly than in the first recrudescence) and again, if necessary, during a third recrudescence it happens, in most cases, that the patient becomes fortified or preimmunized against the disease to the extent that he not only ceases to suffer from relapses but fails to have an attack when he is reinfected.

(5) In the Commission's view, an endeavour to follow that plan should be made for the prevention of relapses of benign tertian and quartan fever. But they consider that, for preventing relapses of malignant tertian fever, it is justifiable to endeavour to sterilize all the parasites by specific drug therapy during the first recrudescence. For this disease the primary attack should be cured by a five or seven days' course of treatment with quinine or with atebria and, if the patient has a recrudescence, this should be treated with a therapeutic course of five or seven days, but using the specific drug which was not used in the primary attack. If treatment during the first recrudescence is not successful in preventing relapses, therapeutic treatment of the third recrudescence should be delayed as long as possible in order to permit the patient to acquire some defensive power.

(6) The Commission believes that, when it is not considered justifiable or practicable to prescribe a system for the prevention of relapses which is based on the above principles, the best practice is to adopt a system of 'clinical prophylaxis' consisting of the administration of a small dose of quinine (0.4 grm.) daily throughout the period of residence in the malarious country and for several months after leaving it. This course should be begun about a week after cure of the primary attack. It is claimed for this system (a) that it protects individuals against serious attacks; (b) that, because it does not entirely eradicate the infection, the defensive mechanism of the body is continuously at work and becomes increasingly powerful as time goes on ('acclimatization without risk'); (c) that it reduces the number of gametocyte carriers and their capacity for infecting mosquitoes; (d) that it enables troops and agricultural and other workers to carry on their daily tasks.

*Prevention of spread (gametocyte therapy).—*As quinine and atebria are each effective for destroying gametocytes in benign tertian and quartan malaria, difficulty arises only with regard to the gametocytes of malignant tertian malaria (crescents) against which those drugs have only a feeble action. Plasmoquine, however, has a powerful action against them. The doses for preventing crescent carriers from infecting mosquitoes should be given twice a week during the period when crescents are present in the peripheral blood. The Commission is of opinion that laboratory and field trials should now be conducted with doses up to 0.02–0.04 grm. in order to ascertain the minimum effective non-toxic dose.

Lastly, the Commission desires to make the following general remarks, which include some suggestions for future study.

It is inevitable that a report which pretends to review modern therapeutics of malaria must deal with the subject from the point of view of persons who are in a position to obtain expert medical advice and effective care rather than from that of the mass of the population of malarious countries. The report does not contain information on plans for treating out-patients who attend at hospitals and dispensaries or the numerous cases of acute and chronic malaria which are discovered during the course of malaria survey work in the field. It is obvious that, so far as methods of treatment and prophylaxis can be put into practice, the same principles are applicable to all classes of

people, but it would require a separate report to describe, even briefly, the arrangements which would be necessary or desirable for dealing with malaria by the use of drugs among large masses of people who are unable to help themselves in the matter. This is a subject to which the Commission has referred in several previous reports, particularly in its second general report, the 'Principles and Methods of Antimalarial Measures in Europe', Doc. CH/Malaria 73. In some respects, the new knowledge described in the present report makes it easier than formerly to plan an effective campaign for dealing with malaria on a large scale by the use of drugs. For example, it is no longer considered correct to use quinine or other specific remedy in large doses for prolonged periods, nor is it any longer considered correct to hold the view that relapses happen because patients are not treated early in the primary attack or are not given sufficient quinine in that attack. Again, it is no longer considered essential that everyone in whose blood one or two parasites are found during a malaria survey, or everyone whose spleen is larger than normal, should be treated as if he were an acute case of malaria or as if he were certainly a source from which mosquitoes are becoming infected. Estimates of the amount of quinine which ought to be used in a country are sometimes based on malaria survey figures of that kind, but it is not a method of calculation that can be justified. Moreover, it might be most unwise in some malarious countries (Africa, for example) to interfere too radically with the natural process by which the indigenous inhabitants acquire immunity to the disease. In a recent enquiry into malaria in Southern Nigeria it was found that, in Lagos, the malaria parasite status of persons in *ordinary health* was that 90 per cent of young children and 50 per cent of adults harbour malignant tertian malaria parasites in their blood. Similar findings in rural districts indicated that, in all probability, practically the entire African population in the Lagos area above one year of age (about 120,000 persons) harbour malarial parasites in their blood continuously. It happens frequently that medical officers in charge of maternity and child welfare centres, or engaged in school medical inspection in African towns, seek advice on the significance which should be attached to findings of that kind from the clinical point of view and enquire what preventive and curative action, if any, should be taken. They report at the same time that the children, although all of them have enlarged spleens, appear, from the results of the usual clinical inspection, to be in a normal state of health and that they attend school and occupy their playtime in the same way as healthy children would do. Evidently what is needed in those areas is, not that every one in whose blood a few parasites are found should be treated with quinine as if he were a clinical case of malaria, but that more intensive clinical investigation should be made to ascertain precisely to what degree chronic parasitism following clinical recovery from the effects of repeated infection and reinfection is, in fact, harmful to the health of the children and adults concerned, and to discover precisely at what period of life curative or preventive action may be urgently necessary or would be most helpful. It is equally evident that, in such cases, quinine, except in very small doses as a tonic rather than as a parasiticide, is less important than is a system of proper diet and other measures for improving general health.

The same selective investigation is essential before beginning a system of treatment designed to prevent carriers of gametocytes from infecting mosquitoes.

These are some of the reasons which lead the Commission to recommend that epidemiological investigations by the antimalarial survey services should be gradually supplemented by intensive clinical and parasitological studies conducted continuously for a long period on selected individuals at particular age-periods. When this can be done in an area it may become possible to replace present schemes of 'mass

treatment' by a rational scheme designed to stop malaria from being fatal and to mitigate its severity without at the same time interfering unduly with the process of acquiring immunity which is so advantageous to the populations concerned when their childhood is passed. It was on these considerations that, in 1927, the Malaria Commission was led to advise malarious countries to be content with the limited aim of organizing their medical and public health services on the principle that the correct antimalarial practice is an endeavour to reduce the severity and fatality of the disease rather than to undertake the more radical measures which are necessary when the object aimed at is complete elimination of the parasites in the area concerned.

THE FOLLOWING NOTE ON THE SUBJECT HAS BEEN COMMUNICATED TO THE REPORTING COMMITTEE BY PROFESSOR B. NOCHT, OF HAMBURG, AND APPEARS TO BE IMPORTANT ENOUGH TO WARRANT REPORTING *in extenso*.

'Up to a few years ago, quinine was the only specific remedy against malaria. However, the nature of its action is not yet fully known. Certain scientists, such as Professor Giemsa, consider that quinine is a parasitocidal remedy which has a direct action on the plasmodia of malaria. I myself and other scientists such as Muhlens do not consider that this theory has been proved; we are inclined to believe that the effect of quinine on malaria is indirect—at any rate to a large extent—in that it mobilizes and strengthens the means of defence of the organism.

The reasons in support of this view are:—

(1) That the action of quinine on malaria parasites *in vitro* is much slighter and slower than its action in the living organism.

It is, in fact, possible to transmit living malaria parasites capable of producing infection several hours after the blood has been taken from a malaria patient and quinine has been added to it up to a concentration of 1 : 5,000. I must admit, however, that there is another explanation of this inadequate action of the quinine—as the malaria parasites are outside the organism in defibrinated blood they have only a *vita minima*. However, according to chemo-therapeutic experience in general, the action of chemo-therapeutic parasitocidal remedies on pathogenic protozoa is more rapid and more marked when the latter are in a state of great activity—for instance, when they are rapidly multiplying. This also applies to quinine and malaria parasites. The young merozoites offer the least resistance to quinine when they are in the organism.

(2) That the action of quinine is more effective in the case of patients who have had several attacks of fever than among those to whom quinine was given during the first attack. Nevertheless, it would be dangerous—at all events in the case of malignant tertian fever—to lay down a hard and fast rule on this matter. In fact, undue delay in administering quinine might give time for the occurrence of increasingly severe attacks of fever and might even endanger the patient's life.

(3) That large, heavy doses of quinine are no more effective than moderate or small doses repeated several times.

Morgenroth's so-called "repulsion theory" explains the action of quinine on malaria by the fact that an appreciable part of this alkaloid, when introduced into the organism, is absorbed by the red blood corpuscles. Hence the red corpuscles can no longer serve as food for the malaria parasites, which then die. If quinine is added to defibrinated blood, a surprisingly large quantity is absorbed by the red corpuscles from the serum—a fact which I had observed and published ten years before Morgenroth. However, I do not endorse the "repulsion theory", as the statement that the red corpuscles absorb a surprisingly large quantity of quinine holds good solely in the case of blood defibrinated *in vitro*. It is a well-known fact that a few minutes after quinine has been introduced into the

living organism (even intravenously) only slight traces can be detected either in the red corpuscles of the circulating blood or in the blood plasma.

However, if we have as yet no very clear idea of the nature of the action of quinine on malaria, the clinical experience of several decades has furnished us with a series of reliable guiding principles which should be taken into consideration in administering quinine.

(1) Treatment with quinine can never be regarded as a *therapia sterilisans magna*. Relapses may occur with any kind of quinine treatment, and there is no means of preventing them. It is therefore impossible to state definitely in the case of quinine treatment that the patient is "cured"—i.e., that the infection has completely disappeared. It is not quinine but time and the organism itself which "cure" malaria patients.

(2) Quinine has no action, or in any case only an incomplete action, on the gametocytes.

(3) Large, heavy doses of quinine are no more effective than moderate doses, but may have very disagreeable secondary effects.

(4) Quinine is not a medicament which has no effect on the organism. After the prolonged daily use in large doses (for some weeks or more), apart from the well-known secondary effects, it produces—at any rate in a large number of patients—chronic poisoning, the chief symptoms of which are a lowering of the defensive and immunizing capacity to such a degree that fever and parasites recur despite the administration of large daily doses of quinine. In certain cases of chronic poisoning, fever is observed without parasites. These cases possibly include a certain number of those described by English authors as pseudo-relapses. As, after several weeks, most patients reduce of their own accord the large initial daily doses of quinine, or suspend the treatment altogether, notwithstanding the doctor's instructions, these cases of "paradoxical" fever due to quinine or of "pseudo-relapses" are not very numerous. However, they are more often found among patients under effective medical supervision—as, for instance, during the war in the military hospitals, I myself came across a whole series of these strange cases among our troops in Macedonia.

(5) In certain circumstances, quinine may cause more or less copious (extensive) skin hæmorrhages either in cases of idiosyncrasy or as a result of the improper, chronic use of large doses, or of the prolonged administration of small doses—such as are employed, for instance, for quinine prophylaxis. Similar observations have already been made in our naval ships in which prolonged quinine prophylaxis was strictly applied.

(6) In susceptible patients, quinine may cause hæmolytic or serious hæmoglobinuria; this occurs in certain cases after a single dose. In the course of my investigations I have found that quinine stimulates to such a degree a whole series of hæmolytic antibodies in the living organism of the animal and increases their activity so greatly that even such small doses of hæmolytic agents as would not by themselves cause intravascular hæmolytic or hæmoglobinuria produce these effects when combined with quinine. Such substances are, for instance, hæmolytic serum, cobra venom, lysocytine and bile salts. It is probable that, in certain cases of malaria—particularly patients suffering from a chronic infection—hæmolytic substances may be formed (autolysin?) and be activated by quinine. I cannot admit, however, that it has so far been possible to prove the presence of such hæmolysin.

While I am of opinion that the six guiding principles mentioned above should be taken into consideration by every doctor treating malaria with quinine, I do not propose to lay down hard and fast rules for this treatment, which must be applied in different ways according to the character and severity of the infection, the nature of the patient and also, in many cases, the district.

The campaign against malaria as a social disease by means of treatment with quinine, which should be as

complete, as thorough and as appropriate as possible, requires—as does, of course, the treatment of this disease by other remedies—a suitable, extensive and effective organization, and, in particular, adequate medical and auxiliary personnel, a sufficient supply of quinine, the goodwill and comprehension of an intelligent and disciplined population. Without this collaboration on the part of the population, it would merely be a waste of money to distribute quinine on a large scale. In most tropical districts, the intelligent collaboration of the population (natives) will be lacking and, moreover, the indolence of the natives and their antipathy to quinine are usually so great as to make it impossible to give adequate out-patient treatment on a large scale. Even where the population is intelligent, disciplined and anxious to help, the result of the campaign against malaria by means of the treatment of patients with quinine likewise depends on a large number of other factors (nature of the malaria, climate, state of nutrition, general well-being, housing). When it is possible to apply the measures under favourable conditions, malaria mortality is nearly always reduced to a minimum, there is a general decline—sometimes very slow—of morbidity, an attenuation of the severity of the disease, and—for instance, in non-tropical countries—an appreciable reduction of malignant tertian.

Since our last conference on malaria, I have become convinced that an intensive campaign against anopheles, where this can be undertaken, does not render the treatment of patients with quinine superfluous; but, when these two measures are applied simultaneously, quicker and more successful results are obtained than with quinine treatment alone.

Of the secondary alkaloids of cinchona, quinidine is as effective as quinine; hydroquinine, which is derived from quinine, is even more effective. Cinchonine and cinchona febrifuge have to be administered in larger quantities and are less effective than quinine in malignant tertian fever. Large-scale experiments with totaquina in human malaria have yet to be carried out.

Prevention by treatment.—By this I mean the regular administration of quinine and other antimalaria medicaments to healthy individuals who have had no obvious symptoms of malaria and wish to ward off this disease. It is common knowledge that infection cannot be prevented by means of quinine. The disease may, however, remain latent. The interruption of quinine prophylaxis, climate—in particular, variations of temperature—defective nutrition, over-fatigue, etc., may cause this latent state to develop into acute infection. This kind of quinine prophylaxis, strictly applied, has given good results and can be recommended (for instance, for workmen, agricultural labourers, soldiers, etc., who at certain periods are obliged to carry out work in malarial districts—e.g., the construction of railways, harvesting or military operations). Individuals who are under treatment can go on working and follow their occupation during the critical period, provided this does not last too long; whereas, without quinine, prophylaxis morbidity might have reached 100 per cent.

The Modern Treatment of the Anæmias

By JOHN F. WILKINSON, M.D., M.R.C.P., Ph.D., M.S.C.
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It is absolutely essential that before any treatment is considered for an anæmic patient a correct diagnosis should be made as to the type and cause of the anæmia; the former usually offers little difficulty but the latter may be less obvious. The importance of this lies in the fact that once treatment has been instituted further attempts at diagnosis may be completely obscured. For correct diagnosis it is necessary to make a complete clinical examination of the patient, followed

at least by a full blood count and a fractional gastric analysis. The former, of course, is essential since anæmia is commonly associated with so many diseases, especially neoplasms, gynecological or other pathological conditions, and pregnancy. In these cases attention will obviously be turned to the primary cause, and secondly to the correction of the anæmic state. In many patients, however, a primary cause may not be found and the anæmia becomes the first consideration. Fortunately more than 90 per cent of the cases of anæmia met with in general practice fall into two large groups, for which satisfactory treatment is now available and can be readily carried out at home. In the more rare blood conditions the special advantages of institutional treatment should be considered.

It will be convenient in discussing treatment to use a classification, though not perfect, based upon current etiological views and methods of treatment. In this way treatment of the vast bulk of the anæmic states becomes a relatively simple procedure. Anæmia (as applied here to a deficiency of red blood-cells and/or hemoglobin) may be due to: (a) acute or chronic blood loss as may occur post-operatively or associated with menorrhagia, etc.; (b) excessive blood destruction, as in the acute and chronic hæmolytic anæmias and familial acholuric jaundice; (c) destruction or complete inhibition of the blood-forming organs (and mechanism) as in aplastic anæmia; (d) defective functional activity of the blood-forming (hæmopoietic) system. The anæmias in the last group appear to be of the nature of deficiency anæmias since they are associated with a deficiency in either (i) the supply, formation or absorption of the anti-anæmic principle (as found, for example, in liver) or (ii) the supply, absorption or utilization of iron.

Treatment of group (a) consists in relieving the primary cause and administering therapy as in group (d) (ii) below; group (b) includes the rarer anæmias that are usually difficult to treat satisfactorily in the patient's home; special treatment is necessary according to the particular condition, the diagnosis of which may offer some difficulties; in group (c) patients with the rarer and fatal aplastic anæmias are enabled to live a little longer by repeated blood transfusions which, however, do not act in any way as a cure. Group (d) comprises the great majority of anæmic patients encountered in practice. The type of deficiency determines not only the character of the anæmia, but also the required treatment. (i) Anæmia of the type of pernicious anæmia (macrocytic hyperchromic anæmia) occurs when there is a deficiency in the supply of the anti-pernicious anæmia principle (as present in liver) to the blood-forming tissues. An adequate supply of this substance in the body is dependent upon the presence of hæmopoietin (an enzyme in the normal gastric secretion), the correct qualitative food intake, and a satisfactory alimentary absorption of the digestion products of these two; consequently, an anæmia resembling pernicious anæmia may be found occasionally in association with pyloric or chronic intestinal obstruction or stenosis, starvation, hæmolytic or 'pernicious' anæmia of pregnancy, sprue and occasionally together with or following gastro-intestinal cancer, operation (gastrectomy or gastro-enterostomy) or intestinal parasites. The anæmia in these cases usually shows a satisfactory response to adequate replacement therapy.

The important feature to bear in mind is that these anæmias appear to be true deficiency anæmias and require an adequate supply of the specific anti-anæmic principle of liver or stomach in order to maintain health. On the other hand, the anæmias in the second and larger sub-group (ii)—due in the main to a deficiency in the supply or assimilation of iron—do not respond to such therapy, but require adequate and massive iron therapy. This group contains the microcytic hypochromic anæmias, such as chlorosis (in male and female), simple achlorhydric anæmia, the Plummer-Vinson syndrome of dysphagia with anæmia, and the microcytic anæmias obviously secondary to pregnancy,

cancer, gastro-intestinal operation (gastroectomy, gastroenterostomy), nutritional anæmias of infancy, starvation. For purposes of treatment the anæmias of group (a) may also be included in this group.

From these remarks it will be appreciated that the great majority of anæmic patients seen in general practice have either a macrocytic hyperchromic anæmia (with high colour index) or a microcytic hypochromic anæmia (with low colour index); the first group requires the anti-anæmic principle as found in liver or stomach, while the second requires iron.

Treatment of macrocytic hyperchromic anæmias

The successful treatment of the anæmias in this group (i.e., usually uncomplicated pernicious anæmia, or less commonly 'pernicious' anæmia of pregnancy) depends entirely upon the three following important factors: (a) the use of an active anti-anæmic preparation; (b) a full and adequate dosage; (c) a palatable and cheap preparation. The anti-anæmic preparations used are mainly fresh, uncooked liver or stomach, or their extracts, administered orally, while liver extracts are now available for administration by the intramuscular route.

Liver.—Fresh raw liver is still used by some, but the dose required in most cases is at least $\frac{1}{2}$ to 1 lb. or more daily. This for most patients is both impossible and nauseating, and hence insufficient amounts are consumed with inevitably unsatisfactory results. A large number of more palatable liver extracts for oral use are available, but, as they are very expensive, an insufficient dosage is consequently taken. Since some activity is lost in manufacture it is important to bear in mind that if it is desired to administer liver extract in place of $\frac{1}{2}$ lb. fresh liver, then the extract derived from about 10 oz. should be given. It is usually necessary to administer the hydrochloric acid and pepsin mixture (see below) with liver therapy, since the latter does not entirely relieve the gastro-intestinal symptoms. There is no doubt at all that for the treatment of pernicious anæmia the use of fresh liver or oral liver extracts does not give as good results as those obtained with stomach preparations or parenteral liver extracts and is even less satisfactory when the spinal cord is involved.

Stomach.—The value of stomach in the treatment of pernicious anæmia, and 'pernicious' anæmia of pregnancy, especially when combined degeneration of the cord is also present, has now been amply demonstrated in many hundreds of cases. The fresh, uncooked stomach may be given in 4-oz. doses daily, but as this is unpalatable to many patients active desiccated preparations, such as 'pepsac', may be employed with advantage. The initial dose should be not less than 1 oz. (approximately three tablespoonfuls), and this full dose should be maintained until the blood count has returned to normal or, if cord changes are present, when these nervous symptoms have gone.

When the blood count reaches, and has maintained, a count of 4.75 to 5.75 million red blood cells with hæmoglobin values of 90–110 per cent, and there are no signs or symptoms of spinal cord involvement, then the dose can be safely reduced gradually (controlling the progress by regular blood counts), but it is wise to maintain a small regular dose indefinitely according to the requirements of the particular individual. It is possible to discontinue treatment in some cases for short variable periods, but very careful control should be kept on the blood condition. If the red blood-cell count falls below 4.25 millions, treatment should be immediately recommended or the dose of stomach increased, especially when infections or complications arise owing to the rapidity with which these cases relapse once they start on the down grade; the ever threatening possibility of subacute combined degeneration of the cord will not permit of undue liberties in treatment. It is important to realize that even slight infections, such as colds and septic processes, will have profound effects on the blood condition; at such times

the dose of whatever anti-anæmic preparation is being used should be increased to the full amounts temporarily.

Desiccated hog's stomach is readily administered in a variety of ways to suit the patient's palate, always provided that heat is carefully avoided, since the stomach active principle is very sensitive to such form of treatment. Most patients prefer to take it mixed in water (flavoured with condiments if desired), milk, port, burgundy, cold beef extract or soup and other cold drinks, or else mixed with butter, potted meat, sardines and similar foods. The response to adequate treatment with an active product is very characteristic. In the course of seven to twelve days the reticulocytes in the circulating blood will have shown a rapid increase in numbers, reaching a peak or crisis of 30 to 70 per cent, according to the initial level of the red cell count—the lower the initial count the greater the peak. From this time onwards the blood count begins to rise rapidly, although the patient will have shown and felt marked improvement often days before this is noted.

Intramuscular and intravenous liver therapy.—It occasionally happens that a patient with pernicious anæmia may refuse to take oral therapy, the gastro-intestinal symptoms, such as vomiting and diarrhoea, may be considerable, or the condition may be so severe and the blood count so low that more urgent treatment is necessary. Excellent results can then be obtained by the use of a suitably chosen liver extract prepared for intramuscular or intravenous injection, and it is abundantly clear that this method is far superior and safer than even blood transfusion, especially when the red cell count is much below 1,000,000 per c.mm. Since these preparations are likely to be used upon extremely ill patients it is absolutely essential that only such products should be used that are guaranteed by the manufacturers to have been clinically tested and shown to be active in the treatment of pernicious anæmia. This is of extreme importance, since so many of these products are quite useless, while price is no indication of value. [The equivalence of these products in terms of fresh liver varies with the different makes: thus, in two English preparations, 1 c.cm. of extract has been made from 10 grams (preparation A) and 20 grams (preparation B), respectively, of fresh liver, but their actual potencies are so great that clinically they give better results than many kilograms of fresh liver or its equivalence in liver extract orally.] The dose to be employed of course varies with the particular brand, but considering preparation A referred to above, which is guaranteed to be clinically potent, I find that the following gives extremely satisfactory results: According to the severity of the condition, 4–8 c.cm. (representing 40–80 grams of fresh liver) are given on the first day, and 4 c.cm. on each of the second and third days. If the case is one of pernicious anæmia and there are no septic or infectious complications, the patient will begin to respond within two or three days, and the blood count will show extremely rapid increases in the red cell count and hæmoglobin percentage. Of course, even quicker improvement can be produced by slightly increasing the above doses. In most cases of pernicious anæmia the blood will return practically to a normal level without further treatment. Control by means of regular weekly or fortnightly blood counts in the beginning enables a careful check to be kept on the progress—as soon as the red cell count shows signs of flagging a further 2–4 c.cm. of the intramuscular preparation should be given. It will be found that when a normal blood count has been reached the injections will be less frequently required, but here again the necessary dose and frequency depend upon and vary with each individual and, amongst other things, the season of the year. In many cases I find that about 2 c.cm. every two to six weeks sufficient. Since this treatment must be continued indefinitely, a more satisfactory method may be to give the initial treatment as above and then as soon as possible commence the administration of say $\frac{1}{2}$ oz. of pepsac, gradually increasing

to 1 oz. as the patient improves under the influence of the intramuscular liver; the latter then being discontinued, the patient continues with an adequate maintenance dose of this desiccated stomach preparation. Under this regime extraordinarily good results have been obtained, while the cord changes have benefited most satisfactorily.

Cost and potency.—The cost of these different forms of treatment shows enormous variations. Thus, fresh liver in daily doses of 8-16 oz. (and the latter may be inadequate) will cost 8d. to 1s. 10d. per day, while fresh stomach in equivalent dosage only costs 3d. to 1d. Liver extracts are far more expensive, and in sufficient dosage (bearing in mind that it has to be continued indefinitely—probably for life) may require a daily expenditure of 1s. 8d. to 6s. 5d. Preparations of stomach also show enormous variations between 8d. and 4s. 10d. for a dose of 1 oz. daily. Price is no criterion of anti-anæmic potency, and fortunately most of the cheapest preparations are more active than many of the most expensive ones. It is important to realize that not only is the hog's stomach treatment much more efficient than oral liver or liver extracts, especially when cord changes are present, but a consideration of the above figures shows that it is infinitely cheaper. For example, it is easily possible to keep the majority of the patients in normal health on maintenance doses of less than 3.5-7.0 grams of pepsac costing less than 2d. per day, whereas the full daily initial doses of 1 oz. only cost 8½d., as against from three to nine times that amount daily if liver extracts are used. It is possible that the intramuscular liver preparations may be even cheaper, but it is too early as yet to be certain of this. This should have an important bearing on the cost of treating panel patients.

Of greater importance than the cost are the hæmopoietic potencies of the preparations used. It is important to realize that these various anti-anæmic products vary enormously in clinical value; the only way to test them is by specially controlled tests on selected cases of pernicious anæmia under observation in hospital and consequently many preparations are being offered for use without previous trial as to their actual hæmopoietic potencies; thus it is possible that cases considered to be resistant to treatment have really not been given any anti-anæmic principle at all. The more chemical manipulation that takes place in their manufacture the greater is the destruction of the active anti-anæmic principle so that, whereas active stomach and liver products are readily made, parenteral liver preparations are not so easy. In the latter case, therefore, every batch should be clinically tested. Until such time as all preparations are controlled it will be wise to use only such products as are guaranteed to be hæmopoietically active after clinical trial on each batch before issue.

The use of hydrochloric acid.—Sore tongue, vomiting, nausea, indigestion, flatulence, and diarrhoea are some of the commonest and most distressing symptoms occurring in pernicious anæmia, and frequently in other anæmias. As the blood picture of the patient improves with treatment, these are often very much relieved, but there is a marked tendency for the flatulence and indigestion to persist when liver is employed—while it may even increase the symptoms in some cases. Rapid relief is readily obtained by the use of the following mixture:—

Rx Acidi hydrochlorici diluti	. 3ss.
Syrupi aurantii	.. q.s.
Glycerinum pepsini (B. P., 1914) ad	℥ii.
Fiat mistura.	

Sig.: One to two teaspoonfuls in a tumbler of water to be taken with each meal.

This, however, is usually unnecessary when active stomach therapy is used, on account of its strong peptic activity and acid reaction.

Treatment of microcytic hypochromic anæmias

In this group the main deficiency is iron. This is frequently accompanied by achlorhydria gastrica. Satisfactory treatment here requires a full mixed dietary, to which must be added massive doses of iron in a suitably active form. A very large number of iron preparations have been employed, many of which are quite useless. The best and quickest results are undoubtedly obtained by using ferrous salts. Unfortunately they do not keep very well and are rapidly oxidized to the less active ferric salts. The most convenient preparations are: (i) ferrous carbonate or chloride, the former in the form of Bland's pills, which must be freshly made and are better given crushed up immediately before use; the effective dose of Bland's pills is 15-25 grains three times daily; (ii) a scale preparation, such as ferric ammonium citrate, given in a mixture, but this has the rather larger minimal effective dosage of 25-30 grains three times per day. No ill effects arise from the use of even much larger doses of these products and, contrary to the usual belief that constipation ensues, one finds that the bowels become more regular and less troublesome. It is essential that these massive doses should be used for it is a frequent experience that insufficient iron is prescribed with negative results. Of course, the required amount will vary in different patients, but usually it is a waste of time, material and money to give less than 45 grains of Bland's pills or 60 grains of ferric ammonium citrate daily in the early stages.

There appear to be no contra-indications to this form of treatment, even when dealing with patients suffering from the microcytic anæmias of pregnancy, and excellent results follow the administration of large doses of iron. On the other hand, iron preparations for parenteral injection are unsafe to use, since the minimal toxic dose is only slightly greater than the therapeutic one. From time to time suggestions have been made as to the value of copper, manganese, liver and marmite in treatment, but there is no satisfactory clinical evidence that they serve any useful purpose in these microcytic types of human anæmias. In some cases it may be necessary to repeat a short course of treatment on the full dosage of iron from time to time, but the necessity for this will be indicated by the periodical blood counts that will be carried out.

Thus, it will be seen that the broad outlines of treatment of these deficiency anæmias are relatively simple once the diagnosis has been made, but it must be realized that there are borderline or transitional cases where the character of the anæmia may change from a microcytic to a macrocytic type or *vice versa*. The treatment then consists in a careful adjustment, according to the type of anæmia at the time—a simple procedure if carried out in conjunction with regular blood counts.

General treatment

It is important that along with the above specific treatments certain general principles should be followed. Thus, complete rest in bed is necessary in the early stages, since the heart is usually in a weakened, fatty state. Although the patient may feel much better after a few weeks' treatment the cardiac condition will manifestly be unable to tolerate a sudden return to normal bodily activity, as will be obvious by the persistence of dyspnoea and palpation, even with a rapidly improving blood count. A full mixed dietary is a necessary adjunct to treatment and is of special importance since starvation has an adverse and retarding influence. The avoidance of complications and sepsis is of prime importance and vigorous measures must be taken to combat them. Other drugs have been suggested for treatment, but they are best omitted unless there is a definite indication for them, e.g., thyroid gland for any coincident hypothyroidism. There is no justification for splenectomy or the use of arsenic in the treatment of these deficiency anæmias. Blood transfusion is definitely contra-indicated in many

cases and unnecessary in the remainder if adequate treatment on the above lines is carried out.

Scheme for treatment of deficiency anemias.

- (1) Correct diagnosis of the type of anaemia before treatment is commenced.
- (2) Complete rest.
- (3) Removal of cause if found.
- (4) In addition to the general treatment vigorous specific treatment as follows:—

Macrocytic hyperchromic anaemia (e.g., pernicious anaemia)

First day, initial dose of intramuscular liver 6-8 c.cm.*

Second and third days, doses of 4 c.cm. each.

Fourth day onwards, continue treatment with 'pepsae' orally (1 oz. daily).

When blood count has remained at normal and there are no cord symptoms, reduce dose slowly to the

*The dose will depend upon the particular brand of intramuscular liver used. The dose given here is for preparation A, described above, in which 1 c.cm. has been derived from 10 grams of fresh mammalian liver.

necessary adequate maintenance dose (varies with each individual).

If cord changes are present, the 1-oz. dose must be continued without reduction.

Increase to full dose of pepsae if infections, influenza or colds, develop.

Microcytic hypochromic anaemia

If no dysphagia present give the following: Pil. ferri carb. (Blaud's pills), gr. xx, three times daily (ferrous chloride in capsules, or ferric ammonium citrate in a mixture may be substituted).

When the blood count is normal again reduce the dose to a quarter. If the blood count is still maintained in the following months treatment can be discontinued.

When dysphagia is present give: Pil. ferri carb. (as above) crushed up before use, or, better still, ferric ammonium citrate (not less than gr. xxx, three times daily) in a mixture.

If relapse occurs, repeat course of treatment as above.

In both cases hydrochloric acid and pepsin is a valuable adjunct since achlorhydria and gastro-intestinal symptoms are very common in these anaemias.

If the nature of the anaemia changes then treatment must also be changed accordingly along the above lines.

Reviews

FRACTURES.—By P. B. Magnuson, M.D. 1933. J. B. Lippincott Company, Philadelphia and London. Pp. xix plus 466, with 317 illustrations. Obtainable from Butterworth and Co. (India), Ltd., Calcutta. Price, Rs. 18-12

THE author of this work is Associate Professor of Surgery in the Northwestern University Medical School, Chicago, and a member of the Fracture Committee of the American College of Surgeons. The latter fact perhaps accounts for a full page list of slogans on the opening page of chapter I, under the heading 'High Lights'.

'Splint 'em where they lie', 'Check frequently with x-rays', 'Watch fixation apparatus constantly', are a few examples from this decalogue. Though sound in precept they are perhaps more suitable, in this form, for a manual designed for the use of nurses and dressers than in a scientific work for surgeons. Apart from this, however, the book is written in an agreeably direct and dogmatic style, as might be expected from a worker of extensive practical experience, and it is refreshing to be able to add that it is clearly a record of personal experience rather than a textbook of many methods culled by the scissors and paste process of extensive reading. There is no bibliography, but this cannot be regarded as any disadvantage to the busy practising surgeon as opposed to the teacher or research worker, and the work is clearly intended for the former.

The text makes easy reading and the language is to the point, but brevity is sometimes carried to excess. The sentence 'Fractures of the patella with separation of the fragments are always operative' while clear as to meaning would certainly meet with criticism in an English book.

A good example of the many practical chapters in the book is to be found in the account of fractures of the skull. The importance of diverting attention from the actual fracture of the bones to the effects on the cranial contents is well emphasized. A section on the mechanism of the circulation of the cerebro-spinal fluid and the part played in lumbar puncture and dehydration methods in the treatment of these injuries is free from all academic matter which might tend to obscure essential points and typical of the precise and assimilable style of the author.

It is unfortunate that the authors of works on fractures should find it necessary to reproduce large numbers of radiographs; many bear reproduction very poorly. Certainly in the reviewer's copy of this book, the large black shadows of the skull, numbered 304 to 308, convey very little of interest or value. The same may be said of several reproductions of films of the tarsus, spine and pelvis. Considerable reduction in the weight of the book would be achieved by a stringent weeding of unnecessary radiographs. In cases where an essentially interesting radiograph is badly a line tracing would be more instructive and undoubtedly clearer. It must be added however that a large proportion of the radiographs are excellent and of real interest, while the pictorial photographs and drawings are of a high standard, serving to interpret the text in the clearest manner. The line drawing on page 251, it should be noted, is misleading. The counterpoise shown attached to the foot is labelled as supporting the weight of the leg and the foot. Surely this is the function of the Pearson cradle frame in which the leg rests. It is correctly depicted in this fashion in the illustration on the preceding page. The counterpoise referred to is usually used to prevent foot drop.

While the author, in the preface, disavows any attempt at dealing with the operative treatment of fractures, several specialized operative procedures, not usually to be found in textbooks on general surgery, are well described and clearly illustrated. These will be welcomed by the man practising away from large centres who is compelled to attempt relief to patients unable to afford a visit to specialists in the larger towns. There must be many such in up-country cities in India.

Special traction appliances for reduction, based on the principle of a Hawley table with perineal pillar, do not appear to be used by Professor Magnuson, and the double inclined plane so much advocated by Bohler of Vienna for fractures of the femoral shaft is not referred to. On the other hand the use of surprisingly simple device for traction during reduction, termed the 'endless loop', is clearly illustrated and deserves to be more widely known.

Although scarcely likely to be used as a textbook by the student reading up fractures, this work is well

adapted as a guide to the junior surgeon on account of its strongly practical outlook. It should not be missed by those interested in injuries of bones, who have already enriched their practical experience by a study of other standard works.

The price is moderate and future editions may be predicted, but the bulk and in consequence the price might be usefully reduced by a careful weeding out of radiographs.

H. R. R.

DEMONSTRATIONS OF PHYSICAL SIGNS IN CLINICAL SURGERY.—By H. Balloy, F.R.C.S. (Eng.). 1933. Fourth Edition. John Wright and Sons, Ltd., Bristol. Pp. xx plus 287, with 335 illustrations, some of which are in colour. Price, 21s.

THIS book was first published in 1927 and in the preface to the first edition the author deplored the modern tendency to rely on laboratory diagnosis to the exclusion of the old-fashioned methods of investigation by the use of the clinician's senses. The model work in this field is Lejar's 'Explorations Cliniques et Diagnostiques', which has since appeared in an English translation, but it is too diffuse and lengthy for the use of the student, whose need for a short manual of methods of clinical examination and the physical signs to be expected in each region of the body are well met by this book. That it is appreciated is shown by the rapidly recurring editions, each of which improves on the last. The changes in the present edition are mainly in the direction of improvement of the illustrations. A beautiful coloured picture of acute lymphangitis of the arm, new illustrations of cases of bronchial and dental cysts, a better picture of Hutchinson's teeth than in the former editions and coloured plates of leukoplakia and carcinoma of the tongue are features of this edition. The section on sub-diaphragmatic abscess has been transferred to the chapter on the thorax and Lockwood's test for chronic appendicitis has been added to the text, though nowadays the surgeon will prefer to rely on the gastro-ileal reflex as demonstrated by the barium meal, a phenomenon which also depends on interference with the mechanism of the ileo-caecal valve. There is a new figure showing palpation of the thickened ureter, but the palpation of the ureteric point on the abdominal wall for tenderness seldom appears in English textbooks, though always given by French writers. There is a new section on gangrene with several nice figures, but it is regrettable to see that the author still adheres to the view that thromboangiitis obliterans is only to be expected in Russian Jews.

These are the main changes in an edition which has enlarged by 15 pages and 30 illustrations and has improved thereby, though it still keeps its character of a 'tipster', which means a disjointed style but perhaps accounts largely for its popularity with students, to whom, as formerly, it can be strongly recommended.

W. L. H.

THE CURE OF HÆMORRHOIDS, VARICOSE VEINS AND ULCERATION, AND ALLIED CONDITIONS: BY MODERN METHODS OF INJECTION AND BANDAGING.—By Stuart McAusland, B.A. (Lond.), M.D., Ch.B. (Liv.). 1933. John Bale, Sons and Danielsson Ltd., London. Pp. 63, with 11 plates. Price, 3s. 6d. net

THIS modest work is intended to be a guide to the general practitioner in the art of non-operative treatment of varicose conditions and as such it fulfils its object very well. The descriptions of technique are clear, the necessary instruments are illustrated and the contra-indications for this form of treatment are very carefully explained. For hæmorrhoids the author prefers the almond-oil-carbolic mixture on the grounds of the absence of sloughing, the reduced number of injections necessary and the absence of hæmorrhage and post-operative discomfort. The reviewer, having

some experience of this technique, can entirely agree in his preference. In a thousand cases the author has had only one ischio-rectal abscess and two thromboses. It is often erroneously supposed that injection causes thrombosis and so obliterates the piles, but its real action is to set up an aseptic inflammation. For varicose veins the author prefers quinine urethane and gets 85 per cent of permanent cures, though he discusses the use of the other solutions. He prefers to start above and work down, which is contrary to the usual practice. The question of whether recurrences are recanalizations of obliterated veins or varicosities of fresh veins has lately been the subject of discussion; the author favours the latter opinion and thinks they are mostly due to neglect of after-treatment. Some brief notes on injection treatment of other conditions conclude a very practical little manual.

W. L. H.

BICKHAM'S OPERATIVE SURGERY.—Seventh volume, 'The newest operations'. By Warren Stone Bickham, M.D., F.A.C.S., and Calvin Mason Smyth, Jr., M.D., F.A.C.S. 1933. W. B. Saunders Company, Ltd., Philadelphia and London. Pp. 849, with 765 illustrations. Price, 55s.

THE final volume of Bickham's 'Operative Surgery' has been written by Dr. Smyth as a supplement to the preceding six volumes and includes an index to the complete work. It summarizes the advances which have occurred in the field of surgery during the eight years that have elapsed since the publication of the previous volumes, bringing all the sections up to date. New operations are described, omissions from the previous volumes rectified, and changes in attitude to the older procedures considered.

The high standard of illustration and general presentation of the previous volumes has been maintained. The text is concise and a short commentary follows the description of each new operation. The sections on surgery of the colon and thorax are particularly well and fully dealt with, these being the regions in which the greatest number of new operative procedures have been devised. Gynæcology is included, perhaps a little unwisely in a work on general surgery.

Though chiefly of interest to possessors of the preceding volumes, this final volume is a self-contained record of recent progress in operative surgery and can be recommended to those who wish to add a modern supplement to other works on the subject.

J. C. D.

MODERN ASPECTS OF GASTRO-ENTEROLOGY.—By Dr. M. A. Arafa, M.R.C.P. (Lond.). 1933. Baillière, Tindall and Cox, London. Pp. xviii plus 374, with 79 illustrations. Price, 27s. 6d.

A few years ago an exploratory laparotomy was an operation of common occurrence. Its rarity to-day in well-equipped hospitals is striking testimony to the progress which has been made in the diagnostic fields of gastro-enterology. This book brings together the clinical, radiological, chemical and optical methods of investigation of abdominal disease in which recent progress has been made, within the compass of a volume of reasonable size.

The author was given three years' study leave by the Egyptian Government and spent the period in visiting various English and Continental clinics. He had unrivalled opportunity to hear the views of many authorities and to compare and summarize their methods. Although his work is largely a compilation it is of value in that few medical men have the time or knowledge of languages to undertake such a task.

The text is systematically arranged and illustrated by original drawings and well-chosen radiograms. The style is clear, though one is a little irritated by the frequency with which proper names are quoted as references to relatively unimportant facts. This minor criticism, however, does not detract from the practical

value of the book, which can be recommended to those interested in the diagnosis of alimentary disease.

J. C. D.

INFECTIONS OF THE HAND.—By Allen B. Kanavel, M.D., Sc.D. Sixth Edition. 1934. Baillière, Tindall and Cox, London. Pp. xvi plus 552, with 216 figures. Price, 30s.

SURGEONS familiar with the earlier editions of this classical monograph will find much new matter in the current edition. The book is about half as large again as the fifth edition which appeared in 1925 and the price has been advanced from 25s. to 30s. It is nevertheless well worth the outlay, and a junior surgeon entering on an operating career will sooner or later have reason to congratulate himself should he take the trouble to read and digest its contents. That the book during two decades should have reached its sixth edition speaks well for the spread of correct notions on treatment in this difficult and, until recently, disappointing branch of surgery. None who have had experience of hospital surgery will be disposed to question the claim put forward by the author that we may expect a restoration to complete function in 95 per cent of the cases with abscesses of the fascial spaces of the hand by careful diagnosis, properly placed incisions, and efficient after-treatment. The principles underlying these factors are taught in this book with a thoroughness which makes it a model of clinical research based on sound experimental anatomy.

The new matter includes much interesting information on human bites and injuries from teeth, metacarpophalangeal joint infections, gangrenous infections, injuries from indelible pencils, cattle hair and other peculiar infections. Special chapters have been added dealing with the functions of the hand, the use of splints, and the prophylactic treatment of injuries. Every chapter has been revised and the changes almost constitute it a new book.

The subject-matter is divided into four parts and it is a distinct advantage to find collected in part I a full account of general principles and details of the anatomical researches on which Professor Kanavel based his teaching nearly twenty years ago. This makes for easier reading than in the earlier editions where pathology and treatment were often mingled with difficult anatomical detail. Few medical men are likely to forget the stress laid in their student days on the surgical importance of certain fascial planes and spaces in the body. Septical minds with a leaning towards medicine rather than surgery have been known to dub them artifacts produced by the skill of the dissector rather than as having any real existence in the living. The deep cervical fascia, Colles' fascia and the pelvic fascia, with other well-marked lines of cleavage and spaces in the body, were however first described by surgeons and not by anatomists. We owe to Kanavel the knowledge that the special fascial spaces of the hand merit as much attention in the teaching of anatomy as those in other parts of the body. These spaces now receive their due attention in modern textbooks of anatomy, but the student will look in vain for an adequate treatment of them in the standard textbooks of London and Edinburgh of twenty years ago. The reader will do well therefore not to shirk the first 150 pages if he desires to follow and master the clinical and pathological matter of the later chapters.

Part II deals with localized infections and special morbid processes as affecting the hand, such as anthrax, syphilis, chronic infections and gangrenous infections, etc., while in part III we find those important conditions, lymphangitis, major fascial space infection and tendon sheath infections which unfortunately sometimes menace the arm if not the life of the patient when the treatment is not based on sound teaching.

Part IV, which deals with complications, sequelæ, and after-treatment will be of special interest to surgeons connected with railways, factories, and mills, in view of the increasing importance and extension of the

provisions of the Workmen's Compensation Act now operating in India. Much interesting discussion will be found in regard to the 'position of function' of the hand. It is scarcely an exaggeration to say that, here in India at least, the principle of conserving the maximum possible function by suitable posture during treatment is too often overlooked. The author's words will bear quoting on this point. 'The hand should never be simply surrounded by hot dressings and permitted to lie in an extended position. It should be maintained in dorsal flexion at the wrist at an angle of 45 degrees; the phalanges at the metacarpophalangeal joints should be flexed to the same angle and, most important, the thumb should be abducted from the palm, adducted towards the ulnar side of the hand and rotated so that the flexor surface of the thumb is opposite the flexor surface of the index finger'. The repeated exhortations in the use of the 'cock-up splint' of student days are usually well remembered in fractures and injuries of the arm, but too often forgotten in the treatment of infections of the hand.

A valuable feature of this closely reasoned and by no means easy work to read is the author's practice of supplying a short résumé in dogmatic terms at the end of some of the more difficult sections. The general get-up of the work is excellent. The book is printed in America and the illustrations are without exception of the high standard we have learned to expect in American medical publications.

H. R. R.

THE SPREAD OF TUMOURS IN THE HUMAN BODY.—By R. A. Willis, M.D., B.S., D.Sc. 1934. J. and A. Churchill, London. Pp. x plus 540, with 103 illustrations. Price, 25s.

THAT the study of the spread of malignant tumours in the human body is a matter of great importance, one would say was quite obvious; yet it is surprising that hitherto no serious attempt has been made to collect this information into book form. This fact alone supplies ample justification for the publication of this book; however, the writer has not only produced a valuable critical review of the subject but has added his own experience in 323 autopsies on cases of malignant disease. These were not mere routine autopsies, but must have been conducted in a most painstaking manner, if they are to be judged by the reports of his findings that form the appendix of the book.

The usual procedure in books on pathology has been imitated and the subject-matter has been divided into two parts which might be labelled, respectively, 'general' and 'special'; part I contains a number of chapters on the different modes of spread of tumour, direct extension, by the lymphatics, by the blood, etc., it includes a chapter on experimental oncology in animals, and concludes with an extremely interesting chapter on the susceptibility of different tissues to metastasis. The author does not believe that the spread of tumours can usually be explained on a mechanical basis, as has been claimed by some workers; here we are in complete agreement with him. Part II consists of chapters each devoted to secondary growths in one special organ or tissue. There is an appendix, to which reference has been made, and a very extensive bibliography.

The book, which is very beautifully produced and contains many very excellent plates, photographs and photomicrographs of tumours, is a most important publication from the point of view of the surgeon, the pathologist and the cancer research worker.

A TEXTBOOK OF MEDICINE.—By American Authors. Edited by R. L. Cecil, A.B., M.D., Sc.D. Third Edition. 1933. W. B. Saunders Company, Philadelphia and London. Pp. xlv plus 1664. Price, 42s.

Writing a book on general medicine in modern times necessitates more than one author undertaking the work, because no one man can write authoritatively on the immense field covered. But the employment of

the one hundred and forty-one contributors who combine in the production of the book under review is rather overdoing the usual practice of to-day.

The multiplicity of authors leads to a very disjointed presentation of the subject that was lacking in similar books of thirty or forty years ago which were written by only one or two authors. An especially striking example of the disadvantage of too many authors is seen in the section on pulmonary tuberculosis to which five different persons have supplied subsections.

The arrangement of the book is also somewhat confusing for the word 'infectious' has apparently been used in its widest sense, as all diseases caused by parasites whether bacterial, filterable, mycological, protozoal or helminthic have been placed together in this section, irrespective of whether the diseases are directly contagious, infectious or need one or more intermediate hosts for their propagation. Although a rough classification of the causal organisms has been followed in arranging this unwieldy group of diseases certain surprises occur when turning the pages; for instance, infection with *Balantidium coli* is separated from the recognized protozoal diseases by those caused by the spirochaetes (*sensu lato*) and is found sandwiched between yaws and trematode infections. Another unsatisfactory condition that arises from this method of grouping is shown by the following example which could be indefinitely multiplied. There is a section headed 'Diseases of the Respiratory System' but the pneumonias and pulmonary tuberculosis are in the infectious section, while tuberculous laryngitis as well as all forms of bronchitis come under the respiratory system. Such a grouping makes the book very difficult to use as it means constantly turning from one part to another.

With so many authorities engaged in the preparation of this work one would not anticipate that there would be any omissions, nevertheless no mention of atabrin appears in the treatment of malaria, and in the same section the treatment of blackwater fever is discussed in four and a half lines devoted to the pros and cons of quinine treatment without any mention of suppression of urine and the danger of heart failure, two of the main things to guard against in this disease.

On p. 420 we note a heading in black type 'South African Trypanosomiasis' and bracketed beneath it in italics 'Chagas' disease'. Then follows a brief but adequate description beginning with the words 'South American trypanosomiasis or Chagas' disease.....'. The heading of course is an oversight in proof reading, but one calculated to confuse the novice in tropical medicine, and to shake the faith of anyone who might use this book for an authoritative statement on a subject with which he is unfamiliar.

Although there is much sound and well written matter in this book the above one or two criticisms will indicate that as a whole it is capable of considerable improvement.

When one turns the last page and lays down the book one wonders if the immense amount of time that must have been spent in its production has been worth while, because it occupies no vacant niche in the vast edifice of medical literature. It in no way replaces the older standard one-volume textbooks of medicine that have been kept up to date after the death of their original authors and in spite of the many alterations, omissions, and additions that have been made in subsequent editions still maintain that indefinable quality of continuity they acquired, being written as they were usually by one man; such a quality is entirely lacking from a volume such as we have just reviewed.

From this thought we are led a step further and that is to wonder whether the publication of medical literature as a whole is not suffering from the same disabilities of overproduction such as are tea and rubber for example, and whether the appointment of an international restriction committee on production in medical literature might not enhance the value of its products,

in the same manner as the value of the above commodities is being increased by this means.

P. A. M.

DISEASES OF THE CHEST AND THE PRINCIPLES OF PHYSICAL DIAGNOSIS.—By G. W. Norris, A.B., M.D., and H. R. M. Landis, A.B., M.D., Sc.D. 1933. Fifth Edition. W. B. Saunders Company, Philadelphia and London. Pp. 997, with 478 illustrations. Price, 50s.

We welcome the fifth edition of this well-known book, which still maintains its popular position in English-speaking countries. The first edition appeared in 1917 and the fact that the fifth edition is available only 16 years after is evidence of its popularity and of its keeping abreast of the times.

The book is thoroughly revised and enlarged, and runs to nearly a thousand pages. There is hardly anything omitted. It is written principally for the clinician and, as the authors have rightly observed, 'Clinicians would do well to remember that the laboratory should be their partner and not their master'.

The book has been divided into four parts. The first two parts deal with the examination of the lungs and of the circulatory system and have been written by G. W. Norris. Separate and exhaustive chapters have been written on inspection, palpation, percussion and auscultation, and their importance shown in the examination of patients. Part III deals with the diseases of the bronchi, lungs, pleura and diaphragm, and part IV with the diseases of the pericardium, heart and aorta. These parts have been written by H. R. M. Landis.

Two interesting chapters have been added:—(1) By C. M. Montgomery, on the transmission of sounds through the chest, and (2) by E. B. Krumbhaar on electrocardiograph in heart disease. The first deals with the fundamental principles involved in the transmission of sounds from within the respiratory tract to the chest surface and the principles discussed have been applied to six typical chest conditions, namely, normal lung, partially collapsed lung, solid lung, pleural fluid, pulmonary cavity, and pneumothorax. The other chapter shows the importance of the electrocardiograph in the progress and treatment of heart disease. It shows how repeated records give valuable information in several ways about the course of the disease and the response of the heart to digitalis.

A brief account of the part played by the bronchoscope in the diagnosis of respiratory affections is also given and is written by L. H. Clerf. The importance of bronchoscopy is evident from the following quotation of Chevalier Jackson—'The internist can tap, look and listen on the outside; the roentgenologist can look through the patient. Add to these the bronchoscopist who can look inside the lung, and we have a tripod on which to base our diagnostic studies, and there would be fewer cases in which a positive diagnosis could not be reached'.

It is difficult to summarize the main features of the book in which everything is already written in a compressed form. The book is copiously illustrated and contains 478 figures of which 4 are coloured plates, and several are photographs of frozen sections from the cadaver, previously hardened in formalin, in order to retain the anatomic relations of the tissues as during life. These will be found to be of great help to the readers. A very exhaustive index is given at the end of the book.

In the opinion of the reviewer, no better book than this could be recommended to those who want to make diseases of the respiratory and circulatory systems their speciality. It may also be recommended to general practitioners who wish to keep their knowledge of these systems up to date. The book is well written, and the printing, illustrations and general get-up are excellent.

Y. G. S.

HUMAN EMBRYOLOGY AND MORPHOLOGY.—By Sir Arthur Keith, M.D., F.R.S., LL.D., D.Sc., F.R.C.S. (Eng.). Fifth Edition. 1933. Edward Arnold and Co., London. Pp. viii plus 558. Illustrated. Price, 32s.

This edition is a distinct advance on its predecessor for by careful selection of the mass of fresh knowledge that is constantly being added to the science of embryology the author has added about sixty pages to the book and increased the number of chapters by two. But when one considers the amount of matter that has appeared on embryology since the first edition of this book was published it is remarkable that it has been kept comparatively short. This has not been done by omission of essentials, but by careful selection and condensation of all the important facts. The book contains 535 figures many of which comprise two or more separate drawings so that the actual number of illustrations is probably nearer 700. Many of these are original, but a considerable proportion have been drawn from other sources and all of them are of value. Constant reference to the figures is necessary to understand this difficult subject and they have been so carefully arranged that one usually finds a figure on the same page as the points, which it illustrates, are described. This adds greatly to the ease and pleasure of reading the book, for there is nothing more annoying and distracting in reading a difficult subject, than to have constantly to turn backwards or forwards for many pages to find a figure referred to in the text.

In the preface, Sir Arthur Keith almost apologizes for having departed in subsequent editions from what he describes as his 'utilitarian ideal' which governed the preparation of the first edition.

He means that he has added facts which at the time of writing perhaps have no clear clinical application, but as he rightly says, 'Who can tell what the clinical utility of any newly discovered fact may prove to be?' The reviewer considers this apology unnecessary, for the wider view of the subject that these added facts give greatly assists in understanding the whole, because, although somewhat dimmed by time, he still has a lively recollection, as an undergraduate, of wrestling with the first edition of this book about a year after it was published, and he finds the present edition much easier to follow.

This is a book that should be carefully studied by all serious students of medicine and surgery for nowhere will they find better presented the numerous facts about the development of the human body that are essential to a full understanding of many of the clinical manifestations of disease.

P. A. M.

PRACTICAL POINTS IN EYE SURGERY AND DRESSING.—By H. E. Jones, M.R.C.S. (Eng.), L.R.C.P. (Lond.). 1933. John Bale, Sons and Danielsson, Ltd., London. Pp. 27, with 3 tables. Price, 2s. 6d.

THIS little volume was not meant to be a cram book, nor in any way a substitute for a textbook on the subject, but was written as a practical guide to nurses, dressers, house surgeons, and general practitioners. It fulfils its function admirably. Probably the most useful part of this very useful little book is the three tables which will be found in an envelope at the end of the book; they are mounted on canvas to ensure long wear, if the reader prefers to keep them in the book, but they are just the kind of table that should be mounted and hung up in the surgery or operating ante-room.

They refer respectively to 'urgent non-traumatic cases', 'common eye injuries', 'operations'; the first two give the points of diagnosis and immediate treatment, and the third the method of preparation required, the instruments used, instructions to the patient, etc. It is an eminently practical book that we can thoroughly recommend.

AN ELEMENTARY HANDBOOK ON RADIUM AND ITS CLINICAL USE.—By D. F. Clephan and H. M. Hill. 1933. Oxford University Press, London. Pp. 164. Illustrated. Price, 7s. 6d.

To the unscientifically-minded public radium is little more than a name of some substance that has wonderful medical and other properties; it is usually associated in their minds with x-rays, if not with 'radio' sets. The medical man usually has clearer ideas on the subject, but even he, unless he has made a special study of the subject, is a little vague about the properties of radium except that it is used in the treatment of cancer, and that it is dangerous stuff to handle. To this latter class of readers the book under review will have a particular appeal.

The book is written by two radium officers of many years' experience at two institutions in London where radium is extensively used in the treatment of cancer and other conditions; it tells in simple scientific language all that the general practitioner, the medical student, and the nurse or the technician in a radium department, will want to know about the origin, the nature, the properties (both physical and therapeutic), the care of, and the technique of the application of radium and other radio-active substances.

The subject is dealt with clearly and concisely, and the authors have not allowed themselves to wander beyond the scope of the book. We have no criticisms to offer except that the time period of thorium is given as a hundred and thirty thousand million years in one place and as 13,000,000,000 in another; time, however, will show which is correct. There is a useful list of references at the end of each chapter. The publishers have produced a neat little volume at a very reasonable price.

VACCINE THERAPY IN ACUTE AND CHRONIC RESPIRATORY INFECTIONS.—By H. T. Gillett, M.D. (Lond.). 1933. H. K. Lewis and Co., Ltd., London. Pp. xii plus 104, with 9 charts. Price, 5s.

THE employment of vaccines in pneumonia and in any acute infection is difficult to justify on theoretical grounds; it is very necessary, therefore, that claims for their value in practice should be carefully scrutinized. The author's claim for the practical value of vaccines in pneumonia rests mainly on a series of cases treated by the writer of the foreword to the book. It seems improbable that given judiciously vaccines will do much harm in pneumonia as long as they are used only in cases where serum was not available for some reason or other; if, therefore, this book stimulates others to give a trial to this form of treatment and to help to settle whether or not it is of value, the book will have served a useful function. There is, however, not much more that we can say in favour of it.

The author's theoretical argument in favour of vaccines in pneumonia, which is roughly that the stimulation of the local reticulo-endothelial cells in the skin tends to produce just a little more anti-toxin and that every little helps, does not sound very strong, but we know very little about immunity as yet, and in the past many much more improbable theories have proved to be right.

The author is an advocate of small doses, and the following sentence appeals to us more from a medical than from a grammatical point of view:—'Contrary to expectation, it appears that large doses of vaccine given prophylactically do not necessarily produce a higher immunity than when small doses are given'. On the subject of influenza, the author who has his own rules of nomenclature says 'the bacillus influenza (B. Pfeiffer) is apparently not always found' and expends a number of pages of this very small book on discussing—not very authoritatively—the aetiology of the disease. We would refer him to the 640-page monograph on this subject issued by the Pickett-Thompson laboratories.

In the section on the technique of vaccine administration he wastes some lines on describing what is

universally known as a tuberculin syringe, he displays considerable optimism over the subject of sterilization, and fails to mention whether the vaccine should be given intradermally, subcutaneously, intramuscularly, or intravenously.

THERAPEUTIC USES OF INFRA-RED RAYS.—By Annandale Troup, M.C., M.B., Ch.B. (St. And.). Second Edition. 1933. The Actino Press, Ltd., London. Pp. 90. Illustrated. Price, 6s. 6d.

THE reviewer did not have the privilege of seeing the first edition of this useful little book, but he gathers that the present edition is rather fuller than the first, though its form is much the same. Dr. Troup is a worthy champion of the infra-red rays; he thinks that the harmful effects attributed to them are often exaggerated, and he does not think that their value as a therapeutic agent has been sufficiently appreciated, the credit due to them often being claimed for other associated rays.

The book is essentially a 'primer' on infra-red rays; it tells in simple words all the medical man needs to know about them—their place in the spectrum, their physical properties, the methods by which they can be applied, their therapeutic indications, and their contra-indications. Their most important use is the alleviation of pain and the curing of painful conditions.

The simplicity of the book does at times border on naïveté, as in the following quotation:—'Infra-red rays, if administered in the form of general infra-red radiation, bring about a marked decrease of the white blood (leucopenia). They have therefore been used successfully in the treatment of leucæmia. Conversely, they should not be used in the treatment of a patient with a low white-cell count'.

To anyone with a strong feeling in favour of uniformity, the practice of printing 'I. R. radiation' on one line and 'infra-red radiation' on the next will not appeal; the abbreviation of so short a word is, in any case, hard to justify.

In order not to close on a querulous note let us repeat that this is a very practically useful book, and that we can recommend it to the practitioner.

A TRANSLATION OF 'MIDWIFERY FOR NURSES'.—By Russell Andrews (Telugu Edition). 1933. The Christian Literature Society for India, Madras. Pp. 269. Illustrated. Price, Re. 1-8

THE Christian Literature Society for India have undertaken the translation into the vernacular of the well-known book of Russell Andrews' 'Midwifery for Nurses'. Up-to-date textbooks in the vernaculars for pupil-midwives are not available, and the society, in endeavouring to place this book before the nurses, has taken pains to see that the translation has been done in an easy style which permits of its being easily understood. The book is got up neatly, with a few diagrams here and there. It is up to date and should prove of great value to midwives under training. The translator has done well in incorporating some of the technical words in the English language without a laborious attempt at translating them. This makes it easier for pupils to follow the class lessons and the day-to-day practice.

The book deserves a place in all teaching institutions where midwifery is taught in Telugu.

A. L. M.

EXTRACTION OF TEETH.—By F. Coleman, M.C., L.R.C.P., M.R.C.S., L.D.S. 1933. Third Edition. H. K. Lewis and Co., Ltd., London. Pp. vii plus 232, with 131 illustrations. Price, 12s. 6d.

CHAPTER I deals with extraction of teeth by what may be termed classical methods. Many valuable hints and examples are given: the author emphasizes the very true fact, that a tooth should be 'played' rather than subjected to force, especially sudden force without reference to the natural paths of least resistance.

Chapter II deals with difficulties and complications, this chapter deserves careful study.

Chapter III is on anaesthetics. It is to be regretted that the directions for injections are not given in more detail.

Chapter IV deals with surgical extractions and modern methods of diagnosis and treatment. If these methods are intelligently applied it will go far to make the difficulties and complications of extractions a thing of the past.

E. H. B.

CONSTITUTION AND HEALTH. PSYCHE MINIATURES. GENERAL SERIES. NO. 60.—By Raymond Pearl. 1933. Kegan Paul, Trench, Trubner and Co., Ltd., London. Pp. 97. Illustrated. Price, 2s. 6d.

RAYMOND PEARL is a biologist, and as such claims it as 'his inalienable right to study man, the most interesting of all animals'. He goes further, he assumes the right to criticize the physician on his own ground, in his attitude towards disease as exhibited in that most aberrant of animals, man. It would be churlish to grudge him his right which he has most assuredly earned by the assistance that he has already rendered to medical science; few medical libraries worthy of the name have no copy of *Medical Biometry and Statistics* on their shelves.

Though we do not grudge him the right to criticize, we do not entirely agree with his criticism. For example, we do not think that his estimate of the attitude of the average physician, as viewing disease as something separate from man, superimposed on a normal individual, attacking and invading the healthy body, and not as an aberrant reaction of the constitution, is correct; it may have been true of the physician of 20 years ago when the bacteriological phase of medical philosophy was at its height but not of the physician of to-day. Nor does he act on this principle in the majority of cases; even when he employs so-called specific treatment, he does not picture the 'invaders' as being knocked out one by one by the drug he is giving—but perhaps we are taking the argument too far; the biological mind does not take much account of treatment.

It is, we hope, needless to point out that we are not criticizing this stimulating little book. It can be read comfortably at one sitting, but its value cannot be judged by its size, as it is of the nature of a catalytic agent, and will excite as much thought as the average thousand-paged textbook.

L. E. N.

THE HISTORY OF MALARIA IN THE ROMAN CAMPAIGNA FROM ANCIENT TIMES.—By the Late Angelo Celli. Edited and enlarged by A. Celli-Fraentzel. 1933. John Bale, Sons and Danielsson, Ltd., London. Pp. vi plus 226. Price, 10s. 6d.

DURING recent years there has been a considerable amount of imaginative writing regarding the part played by malaria in bringing about the downfall of Rome. The author of this book, who has spent his life fighting malaria in the Roman Campagna and who cannot therefore be accused of underrating the importance of this disease, deals with facts, as far as history can be said to provide facts, and does not subscribe to this romantic view of the destiny of this once great empire. The history of Rome, the city, has on the other hand been largely written by the anopheles mosquito. Rome itself has always been comparatively free from malaria, but its compass has been rigorously limited, as every attempt at expansion has had, sooner or later, to be given up; the suburbs of Rome have throughout the centuries seen a series of palaces, built and then abandoned and allowed to fall into ruins. Many emperors and the majority of the popes have made some attempt to deal with the

problem; some of them have had apparent, temporary successes, but in the end they have had to admit defeat. There seems to be little support for the suggestion, obviously made by their enemies, that the popes have deliberately neglected the Roman Campagna so that the miserable condition of this country should form a contrast to the grandeur of the Holy See.

This history is divided into periods—the pre-Roman, the republics, the empire, the early and later middle ages, the modern period, and the latest history, even this last chapter only takes us up to the discovery of the mosquito carrier of malaria; with true Italian courtesy, not always reciprocated, the writer gives the major credit of this discovery to Ross. It is a matter of great regret that Professor Angelo Celli did not live to finish his work. His story of the campaign, which is now being so successfully waged in the Roman Campagna and in the inauguration of which he himself played so strenuous a part, would have formed an invaluable final chapter. The chapter contributed by the editor, his widow, gives us a glimpse at the results that are being obtained, but little in the way of detail as to how this swamp that has defied emperors and popes for twenty centuries is now being turned into a prosperous and fertile country-side.

The book is a most entertaining and scholarly production; it cannot fail to interest the physician, the malariologist, the historian, and in fact anyone who is interested in human welfare. There are about forty pages of references; large numbers of these are to British writers. There is no suggestion that the book is a translation, but it is written in irreproachable English.

L. E. N.

HADWEN OF GLOUCESTER, MAN, MEDICO, MARTYR.—By B. E. Kidd and M. E. Richards. 1933. John Murray, London. Pp. x plus 345. Illustrated. Price, 7s. 6d.

A CRANK has been defined, probably by Bernard Shaw, champion of all cranks, as a person who holds and

acts upon an opinion that is contrary to orthodox teaching, but it is claimed directly he has converted a sufficiently large number of his fellows to his point of view he ceases to be a crank.

This is seldom true, as all worthy cranks have more than one arrow in their quiver. They have made the discovery that the majority is not always right; they assume illogically that the majority is never right, and so oppose all generally-accepted theories. In mediæval days religion provided the best gymnasium for the antics of the crank, but nowadays there is no 'kick' to be got out of religious unorthodoxy and, as his chances of being burnt at the stake have finally disappeared, the crank usually turns to medicine, a vast field in which he can display his perversity almost endlessly.

Dr. Hadwen was the complete crank; he was a disbeliever in the 'germ theory' of disease, an antivivisectionist, an anti-vaccinationist, and an anti-everything that was generally accepted by the medical profession. He caused a great deal of trouble and did much harm, but on the other hand there is no doubt that he did some good; it is very good for the medical profession to have their accepted theories questioned; it shakes their complacency and makes them think. Also there seems to be little doubt that Dr. Hadwen was a sincere, if misguided, man. He had a full life, which extended beyond the allotted span, and a comfortable death. What more could any man, medico, or martyr wish for?

No cause is so forlorn that its champion will not collect a number of disciples; the more forlorn the cause the larger will be the percentage of women amongst these. Dr. Hadwen was always sure of his women supporters, and after his death they have not altogether failed him, but the writers of this biography have not presented a very good case. Had the book ended at frontispiece, which is the photograph of a white-haired, kindly-faced, old man, it would have left a better impression.

L. E. N.

Abstracts from Reports

ABSTRACT OF THE ANNUAL REPORT OF THE PUBLIC HEALTH COMMISSIONER WITH THE GOVERNMENT OF INDIA FOR 1931

VOLUME II

THE Report contains sections on the Health of the British and Indian Armies in India. Owing to the precision and care which are devoted to the health of these two large bodies of picked men, the report necessarily contains much that is of scientific interest to the general practitioner in India, and also to the scientific medical worker and the hygienist. Some of the more general matters will be of interest to the readers of the *Gazette*.

Malaria continues to be far and away the chief cause of sickness in the British Army in India.

Over 6,200 admissions for malaria occurred in 1931. There are two interesting observations on the 'carrier' question. In Wellington, a hill station hitherto considered to be malaria free, *A. maculipalpis* was found to be the carrier; near Rangoon, which is itself considered to be malaria free, at Mingaladon, infections occur and *A. hyrcanus* was proved to be a carrier there. An investigation into 'missed' cases of malaria showed that only 1 per cent of the total admissions might be considered to be 'missed'—a satisfactory conclusion.

The presence of urobilinuria as an aid to diagnosis in malaria was investigated; the result is as yet indeterminate. The presence of albuminuria in malaria

was shown to be common but of a transient nature. It was not due to the quinine given. As the results of trial a combination of atebirin for 5 and 7 days, followed by plasmoquine in convalescence, seems to be suggested as a cure for the individual attack and the infection.

Annual malarial surveys are being done all over India and much useful information collected. A 'weekly dry day' is proving very efficacious in Kohat and similar places. All artificial collections of water in and around cantonments are dried up for the whole or part of a day each week.

Interesting notes on the treatment of nullahs, on spraying, and on the use of mosquito nets and mosquito-proof tents in the field are given.

Enteric fever.—The group is of all importance to the army. There appears to be a slight progressive decrease in the incidence and in the severity of the disease in British troops. In the Indian Army however in 1931 there was a rise both in the case mortality and in the incidence. In both armies, typhoid fever is the commonest type, followed by para A and B. There were 4 cases of 'C' type in the Indian troops. Eighty per cent of cases were diagnosed by blood culture, 25 per cent would have been diagnosed by faeces culture alone and 7.5 per cent by urine culture alone. Wilson and Blair's medium does not seem to give as good results in faeces culture as it does in sewage and water. An estimation of the 'O' and 'H' agglutinins has been carried out for some time. The results with the 'H' agglutinins are in consonance with work elsewhere

and the 'O' agglutinin results are not; but this pronouncement is not final as the 'O' emulsion may not have been satisfactory. The production of 'O' and 'H' agglutinins does not by any means run on parallel lines; this shows the value of carrying out tests for both types of agglutinins separately. The report concludes that 'as far as the diagnosis of these fevers is concerned, there is still no method or combination of methods which is infallible. The opinion of the discriminating physician must still remain the decisive factor in doubtful cases'.

Dengue and sandfly fever.—These are troublesome and cause much disability. In 1931, sandfly fever was the chief offender and caused 50 admissions per 1,000 of the whole army. In local areas such as Landi Kotal the figure was nearly 400 per 1,000. The prevention of sandfly fever must depend solely upon anti-larval methods, no other prophylactics, e.g., nets, etc., are of any use. (An investigation into the breeding habits of the sandfly at Landi Kotal, in which the Indian Research Fund Association is assisting, is at present being conducted.)

Pyrexia of uncertain origin.—This diagnosis is definitely allowed now in the army, and refers to cases where every effort has been made to give a definite diagnosis and has failed. An investigation into all such cases by dividing them into short (less than 7 days) and long (over 7 days) fevers did not yield much information, beyond the fact that certain of them were probably intestinal in origin.

Dysentery and diarrhoea.—These are troublesome factors and difficult of control. The reason is that these infections are, practically without exception, contracted in civil communities outside military control. About 12 per cent of the cases are returned as protozoal, 40 per cent definitely bacteriological and 48 per cent as clinical or having cellular exudates. The Flexner type largely predominates, agglutinating sera for types V, W, X, Y and Z are available but 22.5 per cent of isolated strains failed to agglutinate with these.

'Hoechst' polyvalent anti-dysenteric serum has given good curative results. On the whole the type of dysentery is mild.

Veneral diseases.—A 'disappointing' increase of 142 cases is recorded in 1931.

The usual preventive measures were carried out namely—

- (1) Propaganda and education.
- (2) Provision of games and amusements in barracks.
- (3) Prophylactic treatment rooms.
- (4) Preventive packets.

Smallpox.—Only 4 admissions in the British ranks occurred, with no deaths. Practically 100 per cent of all ranks are protected.

Ophthalmology.—An interesting investigation into trachoma in Sikh recruits showed that:—

(1) The disease is widespread amongst certain classes, particularly Sikhs, amongst whom well over 90 per cent are infected.

(2) Infection starts in childhood and in the great majority progresses to reach a quiescent stage which produces little disability.

(3) In the past, large numbers have been enlisted and served as efficient soldiers throughout their service.

(4) No evidence has been found to show that the disease is so infectious as to render the enlistment of these men a danger either to their fellows in the unit or to British troops serving with them.

In general hygiene, distinct progress goes on in housing, mosquito-proofing, dining halls, kitchen and bath houses. Hospital construction for Indian troops was materially advanced. At Lucknow, dissatisfaction with the municipal water supply has gone so far that it has been decided to provide a separate supply from deep wells for the cantonments.

Child welfare work, combined with maternity provision, continues to make good headway. This is an excellent feature of army hygiene.

The report on the Indian Army follows the same lines as that of the British troops, and most matters of interest common to both are included in the section on British troops.

The report also contains useful reference tables of statistical matter.

ABSTRACTED FROM THE ROCKEFELLER FOUNDATION: ANNUAL REPORT FOR THE YEAR 1932

Part I

GENERAL PUBLIC HEALTH PROGRAMME

THE present programme of the Rockefeller Foundation in public health calls for field research on problems in yellow fever, malaria, tuberculosis, and certain other diseases, with increasing emphasis on careful correlation of studies of disease in its environment with investigations in the laboratory. Through this procedure it becomes possible to define the problems with accuracy and to make headway in the search for more effective and less expensive methods of disease control.

A large amount of money is being spent throughout the world on applied public health, but a relatively small amount on research in connection with definite public health problems.

The Rockefeller Foundation is in a position to carry out research on disease in its natural environment, in almost any place in the world. Such research is always conducted in co-operation with government health departments. When the research is successful, the Foundation aims to assist the governments in preparing and trying out plans for the prevention of the so-called preventable diseases through the application of the knowledge gained by the research.

So long as public health research is limited to isolated stations in the field there will be bafflement from time to time because of the inability to carry promising lines of investigation to a conclusion such as can be arrived at only in a well-equipped base laboratory. The Rockefeller Foundation now has available such a laboratory at the Rockefeller Institute for Medical Research, which has placed adequate space at the disposal of the Foundation in one of its buildings. This laboratory, in which a successful method of vaccination against yellow fever has been devised and many other problems with regard to this disease have been cleared up, is now the backbone of all Foundation work against yellow fever. Work in this laboratory on research problems in other diseases, especially malaria, is under consideration.

YELLOW FEVER

Coming to grips with the disease in the laboratory has meant danger. In the first years of yellow fever work, after experimental animals became available, 33 cases of the disease with six deaths occurred among investigators, who had acquired the infection in the laboratory. A vaccine has now been developed which apparently has stopped all such infections.

High lights of the year were the continued success of vaccination against yellow fever; the verification in the State of Espirito Santo, Brazil, of a mild epidemic of yellow fever occurring in the absence of *Aedes aegypti*, the usual mosquito carrier; the clearing up of a moot point with regard to the virus in the mosquito host by findings tending to show that the virus does not multiply in the mosquito; and, finally, discoveries concerning the relationship between the complement fixation test and the protection test in yellow fever which will enable investigators to interpret the results of these tests with greater clarity.

In West Africa blood specimens were collected in Nigeria, Gold Coast, Dahomey, French Niger, French Sudan, Senegal, Sierra Leone, and Liberia for the purpose of ascertaining, by means of the protection test, whether the donors of these specimens had at any time had yellow fever. The sera of 4,368 natives

residing in 92 cities, towns, and villages were tested. These protection surveys, although incomplete, furnish important evidence on the distribution and epidemiology of yellow fever in Africa. In the regions studied no large area has completely escaped infection. It is clear that widespread unrecognized epidemics have existed in the recent past in many parts of the interior as well as in the coastal regions. It is also clear that reported cases are no index of the actual occurrence of the disease. But from the evidence it is concluded that there are relatively few places in Africa which may be classed as permanent endemic foci of yellow fever. The important reservoir of yellow fever in West Africa is composed principally of numerous epidemics which come and go in native towns.

It would be a mistake to consider the revelations of this immunity survey as indicating an extension of yellow fever and an increased danger. It is our understanding of the disease rather than the disease itself that is increasing. In general, at the present moment, outbreaks of yellow fever seem to be fewer than usual. A limited number of cases of the disease occurred in British territories in Africa during the year. In French territories the disease was more widespread. Thirty-nine cases, practically all of them in Europeans, with 36 deaths, were reported.

Studies of the virus.—In the Rockefeller Foundation laboratories studies of the yellow fever virus and methods of dealing with it are being continued. Viruses are distinguished from bacteria by their ability to pass through filters fine enough to retain the smallest ordinary bacteria and by their invisibility even under high magnification, although recent reports suggest that some of them have been made visible by a special technique. Moreover, viruses cannot be cultivated on ordinary non-living media. A large number of diseases of man, animals, and plants are now known to be due to infection by viruses.

In the yellow fever laboratory in New York the earliest specimens of yellow fever virus preserved by drying while in the frozen state are now over three years old, but they still retain the virus with no appreciable change in virulence. A new machine has been constructed for the automatic regulation of temperature and vacuum conditions during the drying of specimens. The temperature is kept at about -6°C .

Researches recently published show that the virus of yellow fever, as adapted to mice, has been maintained through more than one hundred passages in tissue culture without any change being induced in the property of the virus. It has again been demonstrated that living cells are necessary in the culture medium. The yellow fever virus is neutralized by immune serum in the presence of living cells. But once the virus has become intracellular it is able to withstand the action of concentrated immune serum, and in the cells it maintains a virulence corresponding to the virulence of normal cultures.

Experiments with yellow fever virus gave results which coincide with those obtained with smallpox virus. When the yellow fever virus was mixed simultaneously with monkey immune serum and fresh chicken embryonic tissue, after an incubation period of one to five days no virus was found in the fluid which had been separated from the cells by centrifugation, and very little virus was found in the cells. Only after a six-day cultivation period did definite virulence appear in the cellular part. Quite different results were obtained when the virus was allowed to act on the cells for one or two hours at room temperature before the immune serum was added. In that case the tissue cells, even in the presence of highly concentrated immune serum, retained the same virulence as in normal cultures. In the absence of living cells or on the addition of killed cells virulence is lost in a short time.

Another important study completed in 1932 dealt with the question as to whether yellow fever virus multiplies in the mosquito host. From analogy with malaria and other insect-borne diseases it was natural

to suppose that the disease-producing organism or virus is found in the mosquito because it needs the mosquito as a host in which to develop. This is true in malaria, where the cycle of development of the causal organism within the mosquito is well known. But it appears from the result of a series of delicate measuring experiments that in the highly effective insect host of yellow fever (*Aedes aegypti*) the quantity of virus present never surpasses that originally ingested. The mosquito, in biting the yellow fever patient, takes in, on the average, one million to two million lethal doses of yellow fever virus. This new study clears up an important point in the yellow fever infection cycle.

It was shown that although, exceptionally, the neurotropic yellow fever virus which produces encephalitis can be transferred by *Aedes aegypti*, the fixed neurotropic strain cannot be maintained in the mosquito host so well as the viscerotropic strain. This is probably due in part to the smaller amount of virus ingested by the mosquito on account of the paucity of the virus in the blood stream of the mammalian host.

Vaccination against yellow fever.—It is now possible to vaccinate small numbers of persons against yellow fever with reasonable safety. The virus used has almost completely lost its power to produce illness in monkeys. The immune serum prevents the circulation of the virus in the blood, and it is inconceivable that vaccinated persons might become a menace to their fellow men through the transfer of the altered virus by the mosquito. Although the disease is not produced in the vaccinated persons, a high degree of immunity develops in the course of two or three weeks.

Tests have been made which indicate that the preservation of yellow fever immune serum by rapid desiccation in a vacuum while frozen, and subsequent storage at refrigerator temperatures for a considerable period of time, cause no discernible reduction in the protective power of the serum.

The blood of 28 of the persons vaccinated in New York was tested for power to neutralize yellow fever virus in mice, and all gave this evidence of immunity. Fourteen of these persons were tested as long as one year after vaccination, and one was tested at the end of 18 months. In each case the serum was found to have definite protective power.

Although considerable research has failed to unearth any practical objection to the use of neurotropic virus in immunization against yellow fever if an adequate amount of immune serum is given also, it is obvious that the ideal vaccine virus would be one whose specific reactions had no relation to vital tissue. If a strain of yellow fever virus could be developed which would be incapable of producing harmful effects on any vital organ, this would be of importance in yellow fever control. With this in mind an attempt was made to adapt the neurotropic yellow fever virus to some tissue other than the brain or the tissues of the principal viscera. In the experiments conducted it was shown that the mouse-adapted neurotropic virus could live in the testicular tissues of mice but that the virus was not appreciably changed by a moderate number of passages in these tissues. These experiments have as yet offered no solution to the problem of finding a virus which is completely harmless. They point to the possibilities of further development of the work recounted above, which consists of growing neurotropic yellow fever virus in tissue cultures, entirely apart from living animals.

There are still distinct limitations to the application of the present method of vaccination. It cannot be used in a country into which the introduction of living virus would be dangerous or has been prohibited. In the second place it would be difficult to secure enough immune human serum from recovered or vaccinated persons to satisfy a large demand. A beginning has been made by vaccinating persons who desire protection against unusual exposure to yellow fever, especially those who are actively investigating the disease.

in the field or in the laboratory. Work is going forward in connection with the simplification of the process of vaccination. If simplification could be achieved the road would be open toward a more extensive use of this protective measure.

It seems probable that vaccination may be useful for the crews of aeroplanes making stops in infected regions and for certain travellers if they can thereby avoid quarantine restrictions placed on persons not immune to yellow fever.

Yellow fever without Aedes aegypti.—Although *Aedes aegypti* seems to be the only vector of yellow fever which ordinarily need be considered, several other mosquitoes have been shown in laboratory experiments to be capable of transmitting the infection by biting. Three additional species of *Aedes* in Brazil, and five additional species of *Aedes* in West Africa, as well as two other species of mosquito, have been incriminated.

It has been felt that the possibility of transmission of yellow fever in nature by the mosquitoes other than *Aedes aegypti* which have been incriminated as vectors in laboratory experiments should be kept in mind, particularly if the common stegomyia does not seem to be sufficiently numerous to account for the presence of the disease. During 1932 there was verified the actual occurrence of mild epidemic yellow fever in a region in which *Aedes aegypti* was not present. The only two mosquitoes on the suspicious list seen in the infected area were *Aedes (Ochlerotatus) scapularis* Rondani and *Aedes (Taeniorhynchus) fluviatilis*. *Aedes scapularis* was found more frequently and is believed to be the more dangerous species. The spontaneous disappearance of yellow fever in this area is attributed to the inefficiency of the insect vector rather than to failure of the human host.

It was found that the yellow fever virus may remain alive in ticks for considerable periods. But there was no indication that the virus was transmitted by the bites of infected ticks at any stage of life, nor was any evidence secured that yellow fever virus was passed from one generation of ticks to another through the egg, or that the virus persisted during the transformation of larva into nymph.

In the body of the bedbug (*Cimex hemipterus*) the virus of yellow fever appeared to die off so rapidly that the disease could not be transmitted by injection of the ground-up insects later than the second day after their infecting meal. It is possible that some active virus was eliminated in the faeces during the first and second days, but not later. In general, the bedbug was not incriminated as a vector of yellow fever.

Further experiments were made to determine whether yellow fever might be transmitted by dog fleas or biting stable flies. *Macacus rhesus* monkeys were used as the source of the virus. Experiments were of two kinds: interrupted feeding experiments in which the fleas and flies were allowed to bite an infected monkey and to finish their feeding on a normal monkey, and experiments in which fleas and flies, after having fed, were ground up and the ground mixture was injected intraperitoneally into a normal monkey.

Dog fleas did not transmit the virus of yellow fever in interrupted feeding experiments. The virus was not demonstrable in the bodies of the insects 18 hours after an infective blood meal. But fleas which had fed seven hours previously on an infected animal caused the death from yellow fever of a normal monkey into which they were injected. Stable flies transmitted yellow fever virus to a *rhesus* monkey in an interrupted feeding experiment six hours after an infective blood meal, but not 16 hours after such a meal. Flies which had fed as early as 42 hours previously on an infected monkey caused the death from yellow fever of a normal monkey into which they were injected. Thus the possibility that these two insects, the dog flea and the biting stable fly, might transmit yellow fever virus by interrupted feeding in nature is remote. The fact that the virus

dies out rapidly in the bodies of both insects decreases the probability of their being carriers of importance.

Studies of yellow fever in laboratory animals.—During 1932 there was undertaken an investigation of the specificity and accuracy of the immunity test now being widely used in epidemiological studies of yellow fever, namely, the intraperitoneal protection test in mice. Sera of persons in Canada and China who could never have been exposed to yellow fever virus were tested for protective power against this virus, and the results were compared with results of protection tests in countries where yellow fever is known to exist. The conclusion was that the test is highly specific and useful as an indicator of past infection.

During the year Dr. Max Theiler published another paper on the yellow fever protection test in mice by direct intracerebral injection. This method has certain advantages in that only small quantities of serum and virus are required. The possibility of using a simple intracerebral test in mice for determining quantitatively the amount of protective antibodies in yellow fever immune serum was investigated. Two methods of preparing the virus were used. In the first the virus was prepared fresh each time. There was found to be a great range in the amount of brain tissue containing one minimum lethal dose. The rate of deterioration of virus preparations, although these were made in accordance with a uniform technique, varied considerably. In the second method, preserved virus preparations were used. The limitations of the method of preserving the carefully standardized virus by drying it in the frozen state make the procedure unsuitable for use in the routine testing of sera by the method here presented. Before means are found for standardizing and preserving the virus in large amounts, it would be premature to advocate this method for the routine testing of yellow fever sera in epidemiological work.

The successful use of the mouse as a laboratory animal for yellow fever work led to the employment of the same technique with the guinea-pig. It was found that guinea-pigs are susceptible to intracerebral injections of yellow fever virus fixed for mice, but relatively insusceptible to intracerebral injections of yellow fever virus of monkey origin. The course of the disease produced in guinea-pigs is essentially the same as in mice, but the concentration of virus in the brain of the guinea-pig is much less. The blood plays no part in the distribution of the virus. At death, damage is confined to the nerve tissues. Continued passage of virus in the guinea-pig leads to no alteration in its disease-producing capacity for mice. It was shown also that intracerebral inoculation of neurotropic virus of mouse origin produces typical fatal encephalitis in the agouti, a small South American rodent (*Dasyprocta agouti*). However, the agouti is relatively resistant to the virus. The order of susceptibility in the case of these animals, namely, mouse, guinea-pig, and agouti, may be due in part to the fact that the virus used in the experiments had been adapted to the mouse.

The susceptibility of various Asiatic, African, and South American monkeys to intracerebral inoculation with mouse-brain-adapted yellow fever virus was also repeatedly demonstrated. It was shown that this neurotropic virus produces a well-marked encephalitis in monkeys, which runs a typical clinical course and causes characteristic lesions. Neurotropic yellow fever virus was transferred by intracerebral inoculation through three passages in *Callithrix* monkeys, with the production of uniformly fatal encephalitis. Intracerebral inoculation of another monkey, *Leontocebus ursulus*, with neurotropic yellow fever virus was followed by febrile reaction and in some instances by neurological symptoms and death. No success was obtained in an effort to transfer the virus in series to *L. ursulus*. It was found that encephalitis can exceptionally be caused in monkeys by the bites of stegomyia mosquitoes carrying neurotropic virus.

Aedes aegypti mosquitoes feed readily on certain species of bats. Attempts to transmit yellow fever virus to these bats by means of *Aedes aegypti* mosquitoes and later to obtain the virus from the bats were negative in result.

Complement fixation and precipitin tests.—Work done during the year has served to throw light on the reasons for the discrepancy between the results of the complement fixation test and those of the protection test. A precipitin test was evolved and found to be closely related to the complement fixation test. Positive results obtained from the complement fixation test or the precipitin test were found to be due not to the detection of the antibody which protects against the yellow fever virus itself, but to the presence of an entirely different anti-body (precipitin), produced in response to the presence of a protein substance (precipitinogen) resulting from cellular injury during the course of a severe attack of yellow fever. The precipitinogen disappears with recovery, and the corresponding antibody (precipitin) tends to disappear more rapidly than the protective antibodies resulting from the presence of living virus. In making the precipitin or complement fixation test, the antigen selected for use should be rich in precipitinogen.

The precipitin test promises to be of some value in the diagnosis of acute infections. By reversing the process, it is possible to test for precipitinogen during the acute disease, with a serum containing much precipitin. Since the test requires no extensive laboratory equipment, it is one that should be well adapted to field work.

(Note.—This report is always full of interest and on this occasion it is even fuller than usual. The result is that there is so much we wish to abstract that we have decided to divide it into two parts and publish the remainder in our next number.—Editor, I. M. G.).

ABSTRACT FROM THE ANNUAL REPORT FOR THE YEAR 1932 OF THE SOUTH AFRICAN INSTITUTE FOR MEDICAL RESEARCH, JOHANNESBURG. PUBLISHED BY THE SOUTH AFRICAN INSTITUTE FOR MEDICAL RESEARCH

DEPARTMENT OF BACTERIOLOGY

Pneumonia.—Investigations into the bacteriology and epidemiology of pneumonia as it occurs on the Witwatersrand have been continued throughout the year. A large number of specimens of morbid material from cases of pneumonia and allied acute respiratory diseases were bacteriologically examined. The finding previously reported that the streptococcus, *Staphylococcus aureus* and the *Bacillus influenzae* may be isolated from material in cases of pneumonia, along with or in the absence of the pneumococcus held true for the period under review. The importance of the multiplicity of organisms occurring in respiratory disease among the native labourers on the local mines lies in the fact that a pure pneumococcus vaccine as previously employed in prophylactic inoculation cannot be expected to exert a maximum immunizing effect under present conditions. The vaccine now used, therefore, contains the various prevalent strains of the pneumococcus together with representatives of the other organisms which have been isolated. Large-scale experiments have been, and are still being, conducted to test the value of this mixed vaccine. The evidence accumulated to date is becoming more and more convincing as to the efficacy of this prophylactic agent. On the mines where this means of prophylaxis is thoroughly carried out, a definite and significant diminution in the incidence and mortality rates is recorded, not only in pneumonia, but also in general respiratory infections. In the Northern Rhodesia copperfields, also, which the institute investigated from the point of view of pneumonia prophylaxis, a very satisfactory result has been obtained on one large mine which has adopted this

means of protection. Immediate scientific proof of the value of a particular method in pneumonia prophylaxis can, of course, not be obtained; to date, however, there can be but little question that the evidence in favour of vaccine prophylaxis is more than favourable when inoculated and non-inoculated mining communities are compared.

A striking witness to the efficacy of the immunizing action of the various pneumococci present in the vaccine is the finding that from cases of pneumonia in non-vaccinated persons the old-time virulent pneumococci are frequently isolated, whereas from material in pneumonia occurring in those who have been vaccinated the vaccine strains of this organism are but rarely found. In the latter case various unclassified pneumococci and other organisms are obtained on cultivation of specimens.

Complement in human blood.—A beginning was made in the quantitative study of the blood complement in man and also from the point of view of the part played by it in immunity reactions.

Large numbers of blood specimens were examined from healthy persons, European and native, and from patients suffering from various diseases. These diseases included pneumonia, enteric fever, multiple abscesses, leprosy, allergic conditions, skin diseases and cancer.

A large number of natives suffering from pulmonary tuberculosis was examined. These men were all about to be repatriated to their homes on account of the disease, and in this group a considerable proportion of the patients showed either very slight amounts or no complement in the blood. In these cases the clinical prognosis was almost invariably bad. In nearly 100 leprosy cases examined a similar parallelism was noticed between low complement content and bad prognosis. In cancer cases no such parallelism was observed.

Rabies.—An investigation of South African strains of rabies virus was begun. Nearly every investigated case of human rabies in this country has been found to have been caused by the bite of the yellow mongoose or genet cat. A few cases of rabies have been ascribed to the bite of a dog, but in view of the comparatively wide contact of dogs and meercats in the rural districts, it is surprising that rabies in dogs is of such comparatively rare occurrence, and on this account and from the point of view that in nature the disease is confined to carnivores, the possibility is suggested of South African rabies being a modified form of true rabies. A number of strains of true rabies virus were imported from India for comparison with South African strains by means of cross protection and other tests. The overseas strains, however, have not been found viable on arrival in South Africa and further efforts are being made to obtain a living strain of the Indian virus.

Service Notes

APPOINTMENTS AND TRANSFERS

THE services of Col. A. H. Proctor, D.S.O., V.H.S., officiating Surgeon-General with the Government of Bengal, were placed at the disposal of the Government of India with effect from the 1st December, 1933, on which date he was relieved of his appointment under this Government.

Col. A. H. Proctor, D.S.O., V.H.S., is appointed Inspector-General of Civil Hospitals, United Provinces, with effect from the 9th December, 1933.

Lieut.-Col. H. C. Buckley is appointed Inspector-General of Civil Hospitals, Bihar and Orissa, with effect from the afternoon of the 16th December, 1933.

Lieut.-Col. N. M. Wilson, O.B.E., Chief Medical Officer, Delhi, is appointed Inspector-General of Civil Hospitals, Central Provinces, with effect from the 2nd January, 1934.

The services of Lieut.-Col. R. C. Clifford, M.C., D.S.O., are placed permanently at the disposal of the Government of the United Provinces, with effect from the afternoon of the 30th June, 1930.

Lieut.-Col. K. G. Gharpurey, Civil Surgeon, Belgaum, is appointed to officiate as Surgeon-General with the Government of Bombay during the absence on leave of Major-General H. R. Nutt, V.H.S.

The services of Major A. J. D'Souza, M.C., are placed at the disposal of the Government of Burma for employment in the Burma Jail Department with effect from the date on which he assumes charge of his duties.

Captain J. C. Drummond, whose services have been replaced temporarily at the disposal of the Government of Bengal, is posted at the Medical College Hospitals, Calcutta, until further orders.

This cancels previous notification.

LEAVE

Major-General H. R. Nutt, V.H.S., Surgeon-General with the Government of Bombay, is granted leave on average pay for 7 months and 27 days, with effect from the 29th January, 1934, or subsequent date from which he may avail himself of it.

Major J. S. Galvin, Civil Surgeon, Sholapur, is granted leave on average pay for 8 months, with effect from the 6th April, 1934, or subsequent date of availing.

PROMOTIONS

Colonel to be Major-General

Sir Frank Powell Connor, Kt., D.S.O., V.H.S. Dated 15th November, 1933.

Lieut.-Col. to be Colonel

I. M. Macrae, C.I.E., O.B.E. Dated 15th November, 1933, with seniority 1st March, 1928.

Note.—The promotion of Major N. S. Jatar, D.S.O., to the rank of Major is ante-dated to 1st February, 1926.

To be Brevet-Major

Capt. F. M. Collins. Dated 1st January, 1934.

RELINQUISHMENT OF APPOINTMENTS

The undermentioned officers relinquish their probationary appointments:—

20th December, 1933.

Lieut. (on prob.) F. I. Ashton.

Lieut. (on prob.) J. F. J. Doyle.

RETIREMENTS

Major-General Sir John W. D. Megaw, K.C.I.E., K.H.P. 15th November, 1933.

Col. F. E. Wilson. 7th November, 1933.

Lieut.-Col. M. S. Irani. Dated 17th November, 1933.

Notes

B. W. & CO'S PROCAINE AND ADRENALINE PRODUCTS

BURROUGHS WELLCOME & Co. have introduced three procaine and adrenaline products for use as local anæsthetics.

'Hypoloid' procaine and adrenaline presents procaine hydrochloride 0.02 gm. and adrenaline 0.0001 gm. in 1 c.cm. in solution ready for immediate use. Issued in boxes of ten 'Hypoloid' ampoules.

Each 'Tabloid' hypodermic procaine and adrenaline contains procaine hydrochloride 0.02 gm., adrenaline 0.0001 gm. and sodium chloride 0.009 gm., and a solution can be readily made in the barrel of a syringe. Procaine hydrochloride is often considered far superior to a general anæsthetic for the reduction of fractures, for which purpose the 'Tabloid' product containing sodium chloride should prove valuable. Issued in tubes of twenty.

'Wellcome' brand procaine dental anæsthetic solution is available in bottles of 25 c.cm. Each c.cm. contains procaine hydrochloride 0.02 gm. and adrenaline 0.0001 gm.

RESULTS OF GOLD THERAPY

STATISTICALLY the results of gold therapy are difficult to present; but it has been observed from experience of hundreds of lung and laryngeal cases during the last seventeen years, that gold is capable of promoting the cicatrization of the foel, and the healing processes thereby. Especially clearly was this seen in laryngeal tuberculosis.

RESULTS IN 1,289 CASES OF LARYNGEAL TUBERCULOSIS FROM THE YEARS 1907 TO 1931

	No.	Cured	Better	No change	Worse
Without gold therapy.	962	358 =37.2%	201 =20.9%	210 =21.8%	193 =20.1%
With gold therapy.	327	167 =51.1%	115 =35.2%	18 =5.5%	27 =8.2%

The intramuscular injection of gold oils appears to improve the results still more, because by this method of administration it is possible to store in the body larger quantities of gold, and in a sense to bring about a continuous action.

Technique.—Watery solutions of gold salts are as a rule given intravenously. Smaller doses with longer intervals (initial dose 1 mg., final dose according to the tolerance, 0.1 to 0.25 g.; an injection every eight to ten days) are preferred. In the intramuscular administration of gold oil (oleosolganal, solganal oleosum, Sehering) an advance is registered. From experience, it is best to give injections twice a week, rising from 0.005 to 1.0 of the preparation. Some kidney disturbances were seen, but they were usually limited to a mild form of nephropathia aurea. The other toxic manifestations were less frequent and less severe. These gold oils are therefore to be preferred to all other gold preparations.

COLLOSOL BRAND HALIBUT-LIVER OIL

THE Crookes Laboratories were amongst the first to introduce halibut-liver oil to the medical profession of the United Kingdom. It is claimed that Collosol brand halibut-liver oil represents the finest quality halibut-liver oil on the market. The secret is due to the special solvent-free extraction process, evolved in and employed by the Crookes Laboratories, which enables a beautiful, pure, golden oil to be presented with a vitamin-A value of at least 80 times and a vitamin-D value at least 10 times that of the very finest cod-liver oil.

The great attention to detail which is associated with all the products emanating from the Crookes Laboratories is evinced by a label which is affixed to each bottle of Collosol brand halibut-liver oil stating the number of the particular batch, the date of bottling and the vitamin value by the antimony trichloride test, the biological test and the spectroscopic test.

The range includes the oil, capsules, Halimalt (Collosol Brand Halibut Oil and Malt Extract) and Halidexol (an extremely palatable halibut-liver oil emulsion).

PANDIGAL AND THE GLUCOSIDES OF DIGITALIS LANATA

AMONG the pharmacopœial drugs digitalis occupies a position of such importance that there has been no want of study directed towards the isolation of the active principles.

The reason why this question has become so important is determined by the fact that the drug contains a

number of glucosides whose pharmacological action varies with the locality and the harvesting of the plant. The biological assay of two samples of *folia digitalis* or of two extracts of the leaves may agree in all points within the limit of errors.

Yet the relationship between the several glucosides can vary, so that there is a difference in their therapeutic effects. So far, the vast amount of research work devoted to the isolation of uniform glucosides from *Digitalis purpurea* which might be utilized in a pure state for therapeutic purposes has not led to any definite result.

Moreover, the production of pure purpurea-glucoside is fraught with such difficulties that the only one sold in a pure state is digitoxin; owing to its cumulative effect, however, it has found little favour in therapeutics.

Working on *Digitalis lanata* which is extensively cultivated in Austria, Mannich, Mauss, and Mohs succeeded in isolating four hitherto unknown glucosides among which lanata-glucoside I or, as they termed it, lanadigin is of particular interest.

It was also proved that solutions of lanadigin can be kept for 12 years without suffering even a slight loss of potency. A great advantage rests in the fact that it can be sterilized.

Lanadigin is a uniform and chemically-pure body, therefore invariable in action and the standardizing of its potency by biological assay becomes wholly unnecessary.

The new preparation Pandigal contains this glucoside.

MALNUTRITION AMONG CHILDREN AND ADULTS

A New York newspaper has recently published an article which reveals the alarming proportions to which malnutrition among school children has grown as a result of the economic crisis. It is stated that malnutrition among school children has increased 56 per cent in the last six years, endangering the health of millions of children. This danger threatens especially the poorer classes because their diet is, as a general rule, not so well balanced. By careful tests he found that the breakfasts consumed by many children did not contain more than about half the amount of calories required, according to scientific standards, and even their lunches were deficient in this respect.

The question of supplying nutritious, well-balanced food at low cost is a most important one while the world crisis lasts. Doctors and diet experts have been calling attention to the advantages which certain cereal foods offer because of their exceptional nourishing properties and low cost. Of all the cereals, oats, and especially Quaker Oats, stands out on account of its exceptionally high protein contents, which is much greater than that of wheat or rice, two of the most commonly used cereals.

Many timid, nervous children are often the victims of unbalanced foods. If their food does not give them the minerals which they require for their nerves, the vitamins for their growth and the carbohydrates which give them energy, it is quite certain that they do not have a balanced diet. Quaker Oats contain the right proportions of vital elements to build the nerves and other tissues of the body.

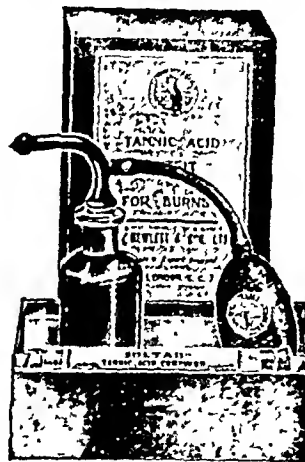
Although the results of malnutrition in adults may be very serious, they may be even worse in children, because it retards their growth and lowers the natural resistance which they need so much to combat the many illnesses which constantly beset them.

TANNIC ACID OUTFIT FOR BURNS

THE tannic acid treatment of burns by means of a spray has been recommended for several years, but the importance of using a freshly-made solution of tannic acid has prevented its universal adoption.

Packets of the powder for this purpose were bulky and inconvenient, but the introduction of compressed tablets, as suggested in the *British Medical Journal* of

18th March, 1933, has eliminated this difficulty, and it is now possible to produce the required solution in a few minutes with the minimum of trouble. The



tablets, which also contain a small proportion of perchloride of mercury and boric acid, are of such strength that one tablet dissolved in 2 ounces of warm water produces a 2 per cent solution of tannic acid. This forms an admirable first-aid dressing, easily applied by means of a spray or on linen or layers of sterile gauze thoroughly soaked in the solution.

A tannic acid outfit for burns comprising an amber bottle with vulcanite spray and best red rubber bellows, together with a supply of tablets, complete in cardboard box as illustrated above is put on the market by C. J. Hewlett and Son, Ltd., 35-42, Charlotte Street, London, E. C. 2, and sold at 5 shillings.

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Original Articles

MEGACOLON AND ITS TREATMENT BY SYMPATHECTOMY*

By D. C. CHAKRABARTI, F.R.C.S. (Edin.)

Surgeon, Campbell Hospital, Calcutta

MEGACOLON is defined as dilatation and hypertrophy of a part or of the whole colon without any palpable obstructive lesion in it. It has been divided into two classes, *viz*, congenital and acquired.

In the majority of cases the sigmoid colon is the part affected, but the dilatation may extend in a few cases through the whole length of the large intestine. This condition is accompanied by dilatation of the bladder in a very small number of cases.

Theories.—Three main theories have been put forward to account for its aetiology, *viz*, (a) developmental, (b) mechanical and (c) neurogenic.

(a) *The developmental theory.*—Some say that it is a developmental dilatation with secondary hypertrophy, others that it is a developmental hypertrophy with secondary dilatation, and according to Hirschsprung it is a combined dilatation and hypertrophy of developmental origin. But no one has explained the developmental error.

(b) *The mechanical theory.*—The following have been held as responsible for this condition—kinking at the pelvi-rectal junction, valves, rectal and anal atresia, etc., but the dilatation of the bladder accompanying it in a small number of cases cannot be explained by any mechanical change in the colon.

(c) *The neurogenic theory.*—Reflex spasm of internal sphincter, non-relaxation of the sphincter, and paralysis of a segment of the bowel have been mentioned as possible causes of this condition. These may be due to relative over-activity of the sympathetic. The circular fibres of the sigmoid colon are supplied by a definite branch of the hypogastric or presacral nerve. This has been confirmed by Learmonth. Relief obtained after resection of this nerve and occasional association of a dilated bladder are points in favour of this theory. The operative treatment is entirely based on this theory.

Some knowledge of the anatomy of this nerve is necessary in order to enable the reader to follow the different steps of the operation.

Anatomy of the hypogastric nerve.—It is not a single nerve but a plexus of nerves running vertically downwards from below the bifurcation of the aorta. It has three roots—one middle

and two lateral. The middle root is the continuation of the aortic plexus. The two lateral roots arise from the ganglia of the lumbar sympathetic and passing medially to the lower extremity of the aortic plexus take part in the formation of the hypogastric nerve at the level of the bifurcation of the aorta. This nerve enters the pelvis and divides into two branches each ending in the hypogastric ganglion situated on the lateral wall of the rectum. Sympathetic nerves for the sigmoid colon leave the aortic plexus above the origin of the hypogastric nerve and pass outwards to be distributed along with the branches of the inferior mesenteric artery.

The parasympathetic nerve supply of the pelvic viscera arises from the second, third and fourth sacral nerves. They form the nervus erigens or pelvic nerve. This also passes through the hypogastric ganglion and its branches are distributed to the wall of the pelvic viscera.

Physiology.—Stimulation of the sympathetic nerves causes contraction of the sphincters of rectum and bladder and dilatation of the walls of these viscera. Stimulation of the parasympathetic produces the opposite effect. In health these two sets of nerves are in a state of physiological balance. If this balance is upset in any way it will lead to over-action of one set of fibres. So megacolon is supposed to be due to relative over-activity of the sympathetic.

The idea of the operation, *i.e.*, resection of the hypogastric nerve described afterwards, is that if the sympathetic nerve supply is cut off the parasympathetic will have its unrestricted action and will cause relaxation of the sphincters and contraction of the bowel wall.

The neurogenic theory is supported by the following case:—

A Mahomedan male, aged about 45, tailor by occupation, was admitted into the medical wards of the Campbell Hospital on the 2nd April, 1933, and transferred to the writer's ward on the 26th April.

Chief complaints

(a) Obstinate constipation, bowels would not move even once in a fortnight. Even four ounces of castor oil made the bowels move only once and that not satisfactorily.

(b) Distension of the abdomen. Before operation the measurements of the abdomen were 51½ inches at a point midway between the xiphoid process and the umbilicus, and 55 inches at the level of the umbilicus.

(c) Loss of appetite.

(d) Pain in the right shoulder joint.

Duration.—About five years.

Skiaogram no. 1 was taken in November 1932 when the patient was in the medical wards for the same complaint. It shows extreme dilatation of the whole colon. No obstruction or kinking is noticed. Eight pints of barium enema had to be introduced and even then the shadow of the colon was not distinct in places. Sacculations of the colon are conspicuous by their absence.

Rectal examination—nothing abnormal noted.

In the absence of any obstructive lesion this case was thought to be neurogenic in origin and sympathectomy was decided upon.

* Being a paper read at a clinical meeting of the Calcutta branch of the British Medical Association on 20th October, 1933.

Operation (Cotte's operation)

A left paramedian incision about 6 inches long was made in the anterior abdominal wall from the level of the umbilicus downward. The rectus sheath was opened and the muscle was



Skiagram no. 1.
(Before operation.)

retracted laterally. The peritoneum was opened and the whole colon was found to be hypertrophied and dilated to a considerable degree. It was of the size of a balloon rubber tyre. The patient was then placed in the Trendelenburg position. The coils of the small intestine were packed off to the right side and the distended sigmoid colon had to be brought out. No kinking or obstructive lesion could be elicited. The promontory, the bifurcation of the aorta and the inferior mesenteric artery were identified. The posterior parietal peritoneum was incised vertically from below the bifurcation of the aorta, and a thick layer of fat was found there. With great difficulty the nerve plexuses were identified in this fatty tissue. The hypogastric nerve was cut transversely below, the cut end was held by a pair of artery forceps and drawn over to the patient's left side, and the roots from the right lumbar ganglia were divided. The aortic plexus forming the middle

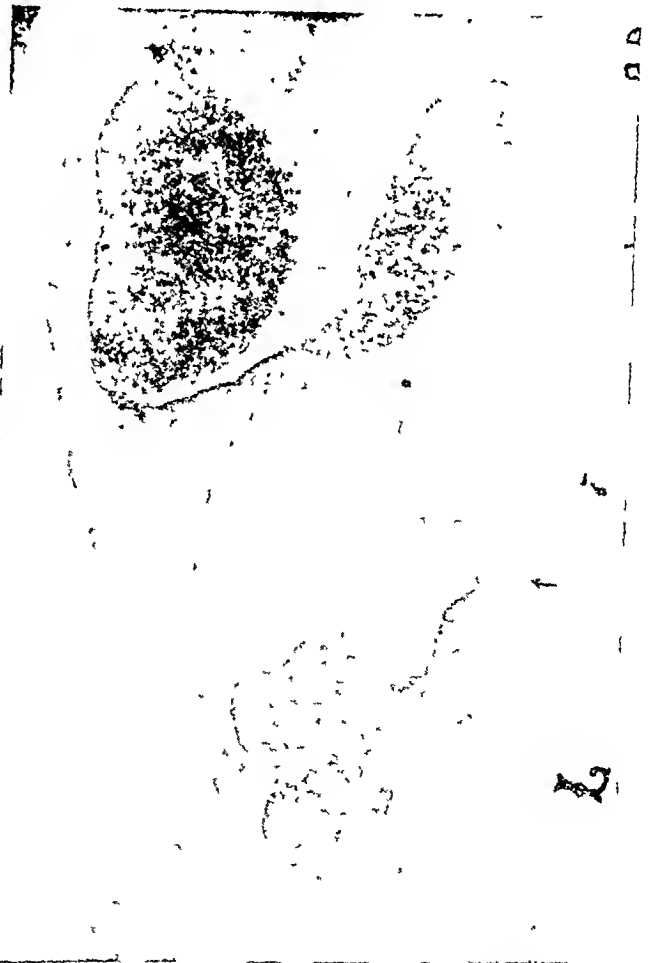
root of the nerve was divided transversely above. The left root which generally forms a ring round the origin of the inferior mesenteric artery was divided and about an inch of the artery was denuded of everything. The nerve accompanying the artery and supplying the sigmoid colon was also divided. The hypogastric nerve being then free could be removed easily. The opening in the posterior parietal peritoneum was closed, and intestines were placed back in position, and the anterior abdominal wall was closed layer by layer.

Results of the operation

(1) The bowels started moving regularly from the ninth day of the operation.
(2) The patient complained of frequency of micturition from the fifth or sixth day of the operation.

(3) The distension of the abdomen gradually became less and less and the abdomen assumed normal size.

At the time of discharge measurements were 33 and 35 inches, respectively, at a point midway between the umbilicus and the xiphoid process and at the level of the umbilicus.



Skiagram no. 2.
(One month after operation)

(4) One ounce of castor oil was sufficient to move the bowels three or four times.

(5) Appetite—improved considerably.

(6) Pain in the right shoulder gradually disappeared.

In fact the patient appeared to be quite normal at the time of discharge.

Skiagram no. 2 was taken about a month after the operation and it shows marked changes in the size of the sigmoid and transverse colon. The haustra were quite distinct in these two parts of the colon.

Skiagram no. 3 was taken three months after the operation and showed further improvement.



Skiagram no. 3.
(Three months after operation)

Three pints of barium enema were sufficient to fill up the whole colon.

During his three months' stay in the hospital after the operation the bowels did not cause any serious trouble, the general health improved and he gained in weight. The complaint of frequency of micturition persisted to a certain extent, till his discharge.

The writer is indebted to Adamson and Aird's (1932) article on megacolon for the description of this condition.

REFERENCE

Adamson, W. A. D., and Aird, I. (1932) Megacolon: Evidence in favour of a Neurogenic Origin. *Brit Journ Surg.*, Vol. XX, p. 220.

ACUTE PERFORATION AND HÆMATEMESIS IN DUODENAL ULCER

By P. N. RAY, B.A., M.B., F.R.C.S. (Eng.)

Hon'y. Junior Visiting Surgeon, Medical College Hospitals, Calcutta

Perforation

ACUTE perforation is a grave complication of duodenal ulcer and its surgical treatment is one of the greatest urgency. The following case has so many unusual features that it seems worthy of record:—

Mrs. K. B., aged 16, was admitted under my care with an 'acute abdomen'.

History of present illness.—Just over two days ago, the patient complained of a sudden attack of severe pain over the pit of the stomach. During the next few hours, there was some relief of pain, but gradually it became generalized and most of it was felt over the lower abdomen. Collapse was complete by the time the patient was brought down to Calcutta for treatment.

History of past illness.—About eight years ago, she had an attack of cholera. There was no previous history of indigestion, but the patient suffered from habitual constipation.

Condition on admission.—Temperature—99°F.; pulse—150, and respiration—30 per minute. The radial pulse was just palpable.

On examination.—Tongue—dry and coated; cheeks—sunken; abdomen—marked distension. No local tenderness or rigidity was present. Liver dullness was obliterated, but shifting dullness was present. On vaginal examination, fluid was detected in the pouch of Douglas and there was a scanty blood discharge from the vagina.

Menstrual history.—Last period 10 days ago; no period was missed. The patient was married one year ago, but there was no issue. Her menstrual periods were rather irregular, but the discharges were normal.

Operation.—(Anæsthesia: open ether and chloroform.) One ounce of saline with glucose was administered intravenously during the operation.

A right paramedian incision was made opposite the umbilicus. The peritoneal cavity was full of cloudy sero-purulent fluid but without any odour. No pelvic abnormality was discovered, and the appendix was found normal. On enlarging the incision upwards, well-marked fat necrosis of the omentum was instantly noticed. A perforation was discovered in the first part of the duodenum, admitting the tip of the little finger. It was closed by means of Lembert sutures and over it an omental graft was apposed. The right paracolic gutter and the pelvic cavity were full of fluid; this was carefully mopped out. Rutherford Morison's pouch was drained in the usual manner and a suprapubic drainage was left in.

The patient passed through a very stormy post-operative period, but she recovered.

Commentary

Owing to the presence of a vaginal discharge containing blood and the complete absence of any previous history of indigestion, the possibility of a ruptured ectopic gestation could not be ruled out. The presence of shifting dullness, associated with absence of liver dullness, and the history of an acute onset with severe epigastric pain were points in favour of perforation of a peptic ulcer. But on these grounds it was not possible to exclude perforative appendicitis. The diagnosis was confirmed by making a rapid exploration of the pelvic cavity and the right iliac fossa.

The perforation of a duodenal ulcer in so young a subject as a girl of 16 is certainly very unusual in Calcutta. In hospital practice, the incidence of duodenal ulcer in the young female appears to be comparatively uncommon in this country. According to Wilkie (1933), duodenal ulcer is more than twice as common as gastric ulcer in the female. The patient was brought to the hospital more than 40 hours, after the perforation, with generalized peritonitis. It is of much interest to note that well-marked fat necrosis was present. Two other instances have been mentioned by Sherren (Choyce, 1932). Recovery in a case like this is exceptional, because the result of operations after 48 hours of acute perforation is almost invariably fatal (McCreery, 1924). The cause of the vaginal discharge in this patient is not clear. It might have been due to an irregular menstrual flow produced by the shock or more probably it was the result of pelvic peritonitis.

The ætiology of duodenal ulcer has not been cleared up. None of the theories of causation is wholly adequate. The important predisposing causes are irregular meals, unhygienic surroundings, excessive smoking and lack of sleep. Cushing (1932) has drawn attention to the fact that nervous instability of the vagotonic type, associated with continued mental worry and anxiety, and heavy responsibility, is prone to produce a hyperactive and hypersecretory stomach. In the young, acute ulceration with early perforation is not uncommon, but in the case of chronic ulcer in a patient aged 35 or more, usually there is a history of dyspepsia for years. It is known that, normally, the duodenal contents are regurgitated into the stomach from time to time by the contraction of the duodenal bulb in the presence of the relaxation of the pyloric sphincter. Undoubtedly, the duodenal reflux is an important mechanism for the regulation of gastric acidity. When it fails, gastric acidity is apt to rise and the neutralization of the highly-acid gastric contents takes place in the duodenum. This fact has been regarded as an important predisposing factor for the development of duodenal ulcer. Once the ulcer has developed, the healing process is retarded by the devitalizing action of the highly-acid gastric contents. Recently, convincing evidence has been adduced in support of the occurrence of ulceration in spite of pyloric relaxation and duodenal reflex, especially in case of jejunal ulcer after gastrojejunostomy (Fontaine and Kunlin, 1932). In this connection, it is of interest to note that, although rare, instances of perforation of duodenal ulcer after gastrojejunostomy have been recorded.

My reason for referring briefly to these points is to emphasize the rationale of surgical treatment in cases of duodenal perforation. In this country, the rate of mortality is high, because the patient seldom comes to the hospital before the onset of generalized peritonitis. Recent statistics show that the percentage of mortality

of duodenal perforation is 12.22, but within 12 hours it is only 8.82 per cent (Seotson, 1933). With regard to the type of operation, it is reasonable to perform the one which will give the immediate lowest mortality. Fortunately in most cases it is possible to close the perforation by inversion and suture. The ultimate result may also be claimed as satisfactory because two-thirds of the patients remained permanently free of gastric complaints (White and Patterson, 1931). It is however essential that a strict regulation of diet with exclusion of all spicy and indigestible articles of food and restriction of smoking are enforced for at least six months after the operation. Further, for at least two years after the subsidence of all symptoms in such a patient, there should be a revision of the case by his medical adviser at regular intervals.

Hæmatemesis

Acute hæmatemesis may be a most alarming complication of duodenal ulcer and it may be of such severity as to terminate fatally. Hæmatemesis occurs in about 30 per cent of cases of gastric and duodenal ulcers. The following case is of interest, on account of its severity and successful treatment:

S., Bengali male, aged 32, was admitted into the Prince of Wales Hospital, complaining of indigestion and abdominal pain of several years' duration; occupation—clerk in a jute mill.

History of present illness.—The patient gave a typical history of duodenal ulcer of several years' duration. The attacks of abdominal pain recurred with a definite periodicity, but, for the last six months, the character of the pain was completely changed. The pain began almost immediately after the intake of food. Though not severe, the pain was almost constant in the epigastrium and was dull aching in character. He did not seek surgical advice earlier because he regarded his condition as 'chronic dyspepsia' and because it did not interfere with his occupation.

History of past illness.—Recurrent attacks of malaria.

On examination.—General health—poor; tongue—coated; teeth—pyorrhœa alveolaris present.

On abdominal examination, no definite signs could be elicited except tenderness in the epigastrium and the right iliac fossa.

On skiagraphy (barium meal).—The stomach tone was poor and it was somewhat dilated. There was well-marked irregularity of the duodenal cap. There was a distinct niche in the lesser curvature close to the pylorus. After six hours, there was a residue in the stomach.

Onset of hæmatemesis.—On the day after the barium meal, the patient had a sudden attack of hæmatemesis. The vomited material amounted to nearly 16 ounces. The usual medical treatment was promptly instituted. Twenty-four hours later, he had a more severe attack, bringing out nearly a pint of blood mixed with clots. The collapse was complete and he passed a very precarious night. Next day, a suitable donor was found and eight ounces of blood was transfused with immediate benefit. There was no further hæmatemesis, but melæna continued for the next three days. A week later, another transfusion of eight ounces of blood was carried out. On both these occasions, it has to be recorded that several students in our ward volunteered for the transfusion, and two of them were selected after blood grouping.

Commentary

Hæmatemesis is usually a late complication of duodenal ulcer. It is in the nature of a secondary hæmorrhage, and clinically it appears either in recurrent small quantities or in a sudden massive flow. Sometimes one follows the other. In the first type, the ulcer is active and has a spreading margin and possibly produces satellite ulcers. In the second type, a large vessel is eroded, e.g., the gastroduodenal, the splenic and rarely other arteries. The severe hæmorrhage is usually preceded by exacerbation of gastric symptoms and also by one or two apparently trivial attacks of bleeding. Recovery is not common after massive hæmorrhage from a large artery. Fortunately, this patient recovered after passing through a very anxious time. It is difficult to say if the barium meal had anything to do with the onset of hæmatemesis. There is no doubt that after his admission into the hospital, there was complete relief of abdominal pain, as a result of strict regulation of diet.

With regard to treatment, the general consensus of opinion is that it resolves into two parts, (i) immediate life-saving measures and (ii) treatment of the ulcer.

The former consists of prompt medical treatment. As a general rule, operative measures are postponed till the patient has sufficiently recovered to withstand them. Occasionally, the hæmatemesis may be severe and lead to death so rapidly that there is no time for surgical treatment. Unfortunately, hæmorrhage may continue in some patients even after the operation. Mere ligation of the vessel is not enough, as bleeding is liable to recur. Usually the general condition of the patient is so low, that a serious operation is not justified and the rate of immediate mortality is unduly high. The mortality after medical treatment alone is about 3.8 per cent, but after surgical treatment the rate of mortality is considerably increased (Ogilvie, 1929). There is no doubt that, in general, medical treatment should be carried out for the arrest of hæmorrhage. Two or three weeks later, when the general condition of the patient has sufficiently improved, surgical treatment may be successfully undertaken. Infolding of the ulcer is a method that can be adopted in an emergency. The more reliable methods are excision or destruction of the ulcer by cautery, but in most cases gastrojejunostomy should be performed. The immediate results of treatment are better in duodenal than in gastric ulcer; the remote are not so favourable (Sherren, 1925).

Summary

(1) A case of perforation of duodenal ulcer in a girl of 16 has been described, in whom perforation was the first symptom of ulceration.

(2) The patient made a remarkable recovery, although she was operated upon more than 48

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VOELCKER'S METHOD OF EXTRAPERITONEALIZATION OF THE URINARY BLADDER: ITS USEFULNESS IN OPERATIONS FOR PATHOLOGICAL CONDITIONS OF THE BLADDER AND THE URETERS

By V. M. KAIKINI, B.A., M.B., B.S., F.R.C.S. (Edin.)
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THE peritoneum is very loosely fastened to the anterior and posterior walls of the bladder but it is firmly attached to the vertex of the bladder over an area about an inch in diameter, and this prevents the complete freeing of the bladder.

When the bladder is filled with air or fluid, because of the loose attachment of the peritoneum to the anterior bladder wall, it is possible to expose a large part of this by pushing the peritoneum upward by blunt dissection. But in dealing with pathological conditions, such as tumours, of the vertex or the posterior and lateral walls of the bladder, where greater accessibility and exposure are necessary, this amount of extraperitoneal exposure of the bladder will not suffice.

In Rydygier's method the bladder is opened by an incision through the peritoneal cavity,

(Continued from previous column)

hours after the perforation. It is of interest to note that there was well-marked fat necrosis of the omentum.

(3) An unusual case of hæmatemesis, complicating a duodenal ulcer, has been described. The onset was not preceded by any of the usual warning signals.

(4) The efficacy of medical treatment, combined with repeated transfusion of blood, is clearly demonstrated in this case.

In conclusion, I wish to thank my house-surgeons, Dr. R. Roy and Dr. M. Chakravarti, for their valuable assistance.

REFERENCES

- Choyce, C. C. (1932). *A System of Surgery*. Vol. II, 3rd Edn. Cassell and Co., London.
- Cushing, H. (1932). Peptic Ulcers and the Interbrain. *Surg. Gyn. and Obstet.*, Vol. LV, p. 1.
- Fontaine, R., and Kunlin, J. (1932). Le reflux duodenal intervient-il dans la production des ulcères peptiques experimentaux? *Presse Med.*, Vol. XL, p. 1752.
- McCreery, J. A. (1924). Acute Perforated Ulcer of Stomach and Duodenum. *Ann. Surg.*, Vol. LXXIX, p. 91.
- Ogilvie, W. H. (1929). *Recent Advances in Surgery*. 2nd Edn. J. and A. Churchill, London.
- Scotson, F. H. (1933). The Treatment and Post-operative Results of Perforated Peptic Ulcers. *Brit. Med. Journ.*, Vol. II, p. 680.
- Sherren, J. (1925). Acute Hæmatemesis and Melæna. *Lancet*, Vol. I, p. 163.
- White, W. C., and Patterson, H. A. (1931). Late Results of Simple Suture in Acute Perforation of Duodenal Ulcer. *Ann. Surg.*, Vol. XCIV, p. 242.
- Wilkie, D. P. D. (1933). Indications for Surgical Treatment in Peptic Ulcer. *Brit. Med. Journ.*, Vol. I, p. 771.

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The bladder is now completely free and detached from the peritoneal cavity, so that it can be opened freely for any operative measures without any risk of contamination of the peritoneal cavity (figure 3).

The principal advantages of the Voelcker method are:—(a) Superior accessibility to the bladder, without any risk of contamination of the peritoneal cavity. (b) The change in the normal anatomical relationship between the peritoneum and bladder created by this procedure is only temporary, as it is found that in a short time the normal relationship establishes itself.

Two operations where this method was used are here reported; one was the removal of a portion of the trigone of the bladder for malignant papilloma, and the other the removal of stones in the bladder and ureter at one sitting.

Case 1.—Diagnosis—malignant papilloma.

V. B., male, aged 30, admitted for painless hæmaturia for the last ten months. On cystoscopic examination a sessile papillomatous growth was found very close to the right ureter (figure 4).

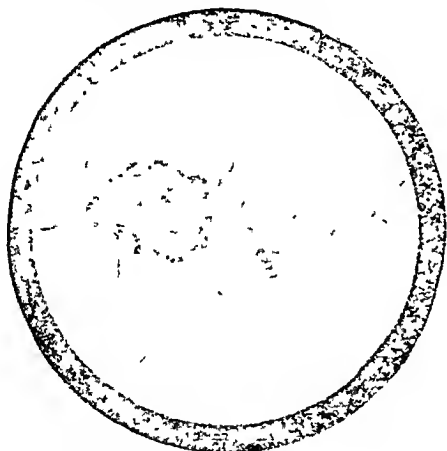


Fig. 4.—Cystoscopic appearance of the trigone of the bladder showing the papilloma and the opening of the right ureter.

The abdomen was opened through a vertical incision. Instead of extraperitonealizing the bladder according to Voelcker's method an attempt was made to detach the peritoneum from the bladder wall according to Lichtenberg's method. This attempt caused ugly tears in the bladder wall, which was already thinned out on account of the bladder being distended with fluid at the beginning of the operation. The peritoneum was thus detached with small portions of the bladder muscle attached to it. The tears in the bladder were at once closed to prevent contamination of the peritoneal cavity and the peritoneal cavity was deliberately opened, to carry out the steps as described in Voelcker's method. The bladder was thus completely extraperitonealized and the right ureter was exposed. The bladder was next opened at the vertex, and a papillomatous tumour, sessile and about the size of a betel nut, was found in the trigone just close to the opening of the right ureter (figure 4). The mucosa surrounding the tumour up to the ureteral opening was hyperæmic and oedematous indicating infiltration. The ureter was found to be quite free on passing a catheter. The posterior wall of the bladder was mobilized and the ureter was freed from its surrounding tissue for about four to five inches (figure 3). As the tumour was close to the right ureteral opening, and the surrounding mucosa

was involved, the right ureter was cut near its attachment to the bladder and kept aside with a catheter passed through it. The portion of the trigone occupied by the tumour and the surrounding portion, half an inch on all sides, were completely removed with a knife. There was a good deal of difficulty in closing the gap thus formed in the trigone, on account of the narrowness of the space. The detached ureter was brought inside the bladder through a separate opening in its wall and re-implanted in its new place. A catheter was kept inside it and it was brought out through the abdominal wound. The bladder wall was found to be rather badly torn in the course of these manipulations and small tags had to be cut away to make the margin of the tears even. The tears were all closed leaving a small gap for a rubber drainage tube inserted into the bladder cavity and for the ureteral catheter. A drain was placed in the cave of Retzius. Urine drained freely through the tube in the bladder and also through the ureteral catheter. On the fourth day the ureteral catheter came out. A catheter was introduced through the urethra on the fifth day and kept there for about four days. On the tenth day the patient was able to pass a little urine himself through the urethra. Gradually he was able to pass more and more urine but the retentive power of his bladder was limited, so he had to pass urine every three or four hours. But this condition also improved gradually. On the fifth day he complained of some pain in the right kidney which disappeared within twelve hours. He was discharged completely free from all symptoms after about four weeks. The operation was done in September 1932 and at present he is enjoying good health and earning his livelihood as a fruit seller. The tumour was found to be an epithelioma, on pathological examination.

Case 2.—Diagnosis—stone in the bladder, and a stone in the right ureter at the level of the fourth lumbar vertebra.

N. G. A., male, aged 36, complained of difficulty and pain during micturition for a year and a half, with passage of pus. The right epididymis was very tender and the patient had all the symptoms of a severe attack of cystitis. The general condition was far from satisfactory. An ordinary skiagram and pyelography revealed two small stones, one in the bladder and another in the right ureter at the level of the fourth lumbar vertebra (figure 5).



Fig. 5.—Skiagram (of case 2) showing one small stone in the right lower quadrant of the pelvis and another stone at the level of the body of the fourth lumbar vertebra.

The abdomen was opened by a vertical incision. The bladder was extraperitonealized according to Voelcker's

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HERNIAS OF THE LARGE INTESTINE : WITH SPECIAL REFERENCE TO SLID- ING HERNIAS

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ANY portion of the large intestine, namely the cæcum, ascending, transverse, descending or

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method, and the peritoneal cavity was carefully closed and isolated by means of abdominal towels. The bladder was then opened at the vertex and the stone removed.

Next, the ureter was followed up along its proximal course by lifting up the posterior parietal peritoneum from the posterior abdominal wall. A small tear occurred in the peritoneum during this manoeuvre, which was at once closed. There was a good deal of difficulty in reaching the stone. However it was located with the finger tips at the level of the fourth lumbar vertebra and was with some effort milked downward and removed by an incision in the wall of the ureter. The incision in the ureter was not closed.

Next a drainage tube was inserted in the area behind the posterior parietal peritoneum and brought out through a stab wound in the right flank. The opening in the bladder was closed and a rubber tube inserted in it for draining the urine. The abdominal wound was closed with another tube in the extraperitoneal space behind the bladder. Urine drained freely from the tube inserted through the stab wound in the flank and also from the bladder tube. The tube in the flank was removed after about eight days and urine stopped coming through the opening after about fifteen days. After three weeks the bladder tube was removed and a urethral catheter inserted. The patient's general condition steadily improved. The pus in the urine stopped after the administration of intravenous acriflavine.

Comment

(1) Extraperitonealization of the bladder gave good access to the trigone facilitating complete removal of the malignant tumour with some portion of the surrounding area.

(2) The process of extraperitonealization is a comparatively easy one and interference with the peritoneal cavity is negligible.

(3) In the two operations reported above, the bladder was distended with fluid at the beginning of the operation causing stretching and thinning of the walls which caused tears in the process of detaching the peritoneum. So the bladder should be washed out at the beginning of the operation and left empty.

(4) In the second case, but for the above method, the patient who was very much debilitated would have had to undergo two operations, one for the stone in the bladder, either litholapaxy or suprapubic cystotomy, and another for ureteral stone situated fairly high up, which would have required a lumbar incision. By the above method the patient had very little shock and convalescence was uneventful.

REFERENCES

- La Roque, G. P. (1931). *Surg. Gyn. and Obstet.*, Vol. LIII, p. 205.
Sugar, H. (1930). *Ibid.*, Vol. L, p. 69.

the sigmoid colon, can form a part of the contents of a hernial sac, in the same way as the small intestine does, but of special interest are the hernias of the cæcum, and of the ascending and the descending colon, when they slip down behind the peritoneum leading to the formation of the so-called 'sliding hernias'.

B. P., aged 40 years, was admitted on 29th August, 1933, with a left inguinal hernia about the size of a coconut, of 8 years' duration. The inguinal canal admitted three fingers, the mass was tympanitic on percussion; on reduction some of the contents went back into the abdomen with a gurgle, but a part of the swelling still persisted and remained tympanitic. The patient had had a chronic cough for about 3 years. After being treated for his cough he was operated upon for his hernia on 10th October.

On operation, the sac which seemed to have fleshy adhesions anteriorly and medially was found to contain the ileum and the appendix, and there was extreme difficulty in reducing the contents completely, and in clearing the sac up to the neck, particularly on the medial and anterior aspects. On attempting to liberate the sac on its inner side a doughy mass could be traced downwards into the scrotal bag and over it ran a longitudinal band resembling the ductus deferens adherent to the hernial sac in the ordinary way. On separating the mass from the scrotal bag it was found to be a loop of the large bowel lying outside the hernial sac. The portion of the loop adjacent to the sac was narrower than the rest and was firmly adherent to the sac on its posterior and outer aspect for a short distance.

Evidently the case was one of sliding hernia of the cæcum and the ascending colon. The lower part of the ileum, the appendix and the cæcum can easily form the contents of an inguinal hernia on the right side and the sigmoid colon on the left, but the presence of the cæcum and ascending colon in an inguinal hernia on the left side, particularly extraperitoneally, is uncommon, and it is no wonder that such a condition affords an unpleasant experience to the surgeon. Such cases are difficult to deal with and should be taken up cautiously by a surgeon of limited experience. The diagnosis of such a condition beforehand is, however, almost impossible except where the coverings of the hernia are very thin, so that the contents may be recognized by palpation, and the hernia is a large one. The fact that in the above case only some of the contents could be reduced with a gurgle, leaving behind a doughy mass still tympanitic, should have roused suspicion, because in such a case, the irreducible tympanitic mass could be none other than a loop of the bowel adherent inside the sac or an extraperitoneal loop of the cæcum, ascending or descending colon, always so difficult of reduction; the advisability or not of undertaking operation for such a condition should be seriously considered.

The occurrence of the cæcum and ascending colon in an inguinal hernia on the left side is rather hard to imagine, but is quite a possibility when we consider the development and transposition of the intestinal tract in the foetus. In the foetus, the midgut from which are developed the small intestine and the large intestine

up to the transverse colon, for the most part lies outside the abdomen in the root of the umbilical cord, at one stage of development. This is in the form of a loop with a dorsal mesentery, in the substance of which runs the superior mesenteric artery, from the aorta to the summit of the loop, dividing it into a pre-arterial and a post-arterial segment. During the fifth week a small diverticulum appears upon the post-arterial segment to form later on the cæco-appendicular region. As the embryo grows, the extra-abdominal loop retracts into the abdominal cavity, and the pre-arterial loop, from which is developed the small intestine, occupies the right side of the abdomen, and the post-arterial loop, from which is developed the large intestine including the cæcum and the ascending colon, occupies the left half. As growth advances, the small intestine grows downwards and to the left behind the mesenteric vessel, and due to the same impulse the cæcum crosses the middle line to the right finally reaching its resting place in the right iliac fossa. When the cæcum and the ascending colon have reached their normal position, the former to a very small, and the latter to a very large, extent become denuded of the peritoneum on the posterior aspect, partly because the bowel outgrows the serous covering and partly because the lateral walls of the abdomen as they grow, pull with them a part of the peritoneum from off the ascending colon. During this process of development the cæcum and the ascending colon may not be properly transposed to the right side, and thus may remain on the left side of the abdomen and may also retain the mesentery; therefore the cæcum and the ascending colon may enter not only the right inguinal hernia but also the left, and when also underdeveloped will find entrance more rapidly through the inguinal canal. Thus the presence of the cæcum and the ascending colon in the left inguinal hernia can be accounted for in one of the following ways:—

(1) By want of perfect transposition in the process of development.

(2) By unusual length of the mesentery due to defective development.

(3) By a combination of the above two conditions.

(4) By a process of 'pulling' and 'pushing' mechanism.

The mechanism of 'pulling' and 'pushing' is particularly at work in producing the extraperitoneal sliding hernias. The 'pulling' mechanism is at work in large hernias and here the ascending colon is accompanied by other viscera, *viz.* the cæcum, the appendix and even the small intestine. The 'pushing' mechanism is at work in small hernias and these are entirely devoid of sac and will be very puzzling.

Treatment.—The treatment of hernias of the large intestine where the loop of bowel has an almost complete covering of the peritoneum in no way differs from a hernia of the small intestine; here the contents can be easily reduced

and the sac excised. But the treatment of sliding hernias of the large intestine is at times a matter of exceptional difficulty. The surgeon must be thoroughly acquainted with all the forms and possibilities of such a hernia, because serious and irreparable damage may be done by ignorant surgery. When the cæcum and ascending colon herniate extraperitoneally, they sometimes undergo a partial rotation, so that the posterior surface of the bowel, which is without peritoneal covering, may form the anterior and the outer wall of the tumour, and as such may be mistaken for the sac covered with the various strata, and, one of the tænia coli simulating the ductus deferens adherent to the sac, the latter may be incised with disastrous results. In small extraperitoneal hernias caused by the 'pushing' mechanism, the bowel is devoid of sac, but the loop of the bowel is so small that it can be pushed back into the retroperitoneal space with a little blunt dissection, and then deep sutures are passed taking care that the gut is replaced into its normal position while the sutures are being tied. Sliding hernias, caused by the 'pulling' mechanism, are usually large. On opening the sac, while most of the contents can be reduced it is found that a small piece of the intestine resists all efforts at reduction. By enlarging the incision in the sac and examining the interior, it is found that the irreducible loop of the bowel has perhaps a longitudinal muscular band on it as well as some appendices epiploicæ. In this variety of the hernia, the nutrient vessels of the gut are usually pulled on with the gut. Separation of the peritoneal sac will naturally deprive the bowel of its blood supply and with the attendant danger of gangrene and perforation. The way in which the operation for such a hernia is performed is as follows:—

The sac and the herniated intestine along with its blood vessels is lifted up from the posterior part of the hernial bag without seriously damaging the blood vessels of the herniated bowel. If the sac and the herniated loop of bowel are now lifted vertically up, it will be found that the sac falls on either side of the bowel, covering its nutrient vessel. The sac is now stitched here and there by a few stitches, thus forming a sort of mesentery for the bowel, and then there will be no difficulty in reducing the portion of the intestine. The remaining part of the sac is closed by a running suture and the usual radical operation is completed.

Another way in which this condition can be dealt with is as follows:—Having recognized the nature of the hernia, the inguinal wound is packed with gauze and the abdomen is opened through a separate incision. With the patient in the Trendelenburg position, the colon is pulled up into the abdomen and colopexy done to fix it up to the posterior abdominal wall. The abdominal wound is closed,

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NOTES AND OBSERVATIONS ON 'INFANTILE BILIARY CIRRHOSIS'

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Idiopathic enlargement of the liver, commonly known as infantile biliary cirrhosis, is a disease of childhood which presents considerable difficulties, both in diagnosis and in treatment. The literature on this subject is exceptionally scanty and scattered. In this paper, which is based on the clinical observations on a few cases and the detailed notes collected from various sources, it is my idea to present in a connected form the important points associated with the disease.

Infantile biliary cirrhosis, infantile cirrhosis of the liver, or infantile liver, is a definite disease entity of infants characterized by an insidious onset, a rather slow course, enlargement of the liver and spleen, jaundice, late ascites, and an invariably fatal termination. It cannot be a form of kala-azar as Castellani and Chalmers (1919) have suggested, as it is found in many parts of India where kala-azar does not exist.

History.—No mention of the disease is made in any of the older writings. Sen (1887) first described it and mentioned it as one of the causes of hepatic enlargements in infancy. In the following year Gibbons (1891) described in detail the morbid anatomy and pathology of the disease. Mukherji's (1922) booklet on the subject is the next notable contribution. Since then, a few papers on the subject have appeared, mostly dealing with its aetiology and treatment.

Geographical distribution.—It is noteworthy that the disease has not been reported from outside India except one similar case from Mexico and a few cases from North China. Whether the aetiological factors operating are particularly Indian or whether the disease is merely not reported from other countries, it is yet difficult to say. In India, cases have been reported mostly from Calcutta, Bombay, Madras and the United Provinces. It is common in Malabar, Travancore and Mysore. Mukherji (1922) says that the disease is more prevalent in the cities and the *mofussil* towns than in the villages. Possibly this is due to the greater opportunities for accurate observation in the cities, and not to any really restricted prevalence.

Aetiology.—The disease is common among the Hindus, very much less among the Moham-medans, and rare among the Anglo-Indians. It does not make any distinction between castes. The children of the rich and the middle classes are relatively more prone to it than

those of the poor and the labouring classes. Overfeeding may have something to do with this disparity. The disease tends to run in families. The first child is said to be the more frequent victim. Probably more male children are affected than female. It is rare before six months and after three years of age. Usually it begins during the time of dentition or between the sixth and the eighth months. In many cases the mother will have already conceived by this time. The greatest death rate is between nine months and two years.

A number of theories has been advanced from time to time regarding the cause. Many of them do not bear close scrutiny. The disease is restricted to India practically. Such a limited distribution argues against almost all the theories hitherto propounded. Neither alcoholism in the parents, nor syphilis seems to have anything to do with the aetiology. If alcoholism in the parents had any part in the causation of the disease it should have been prevalent in other countries as well, where alcohol is much more freely used. Many cases of infantile biliary cirrhosis are known to occur in children whose parents are unquestionable teetotalers, and, *per contra*, the disease is not particularly common amongst children of parents of very intemperate habits. Besides, the pathological changes in the liver in this disease are nothing like those of an alcoholic liver, except the enlargement. Syphilis in the parents can also be ruled out. The Wassermann reaction of the blood is repeatedly negative in the patients as well as in the parents. It is true that the Wassermann test is not positive in a hundred per cent of cases of hereditary syphilis, but it is difficult to believe that *all* the cases of infantile biliary cirrhosis are cases of infantile syphilis with a negative Wassermann reaction. No other evidence of congenital syphilis is present in these cases of hepatic enlargement, nor are the features of the two diseases identical. The urban distribution and the comparative infrequency of infantile biliary cirrhosis in rural areas are against a malarial aetiology. Infantile biliary cirrhosis is fairly common in places like Malabar where kala-azar is unknown, while it is not seen more commonly in the kala-azar endemic areas than in other places. Besides, no case of infantile biliary cirrhosis has been reported from the Mediterranean area where kala-azar is almost exclusively confined to children. Clinically also these two diseases differ. Amyloid degeneration, infection, bacterial or parasitic, or ascending cholangitis have all been suggested as causative factors, but the available evidence does not support any of these.

Deficiency of vitamin C.—This in the infant's dietary has been adduced as the cause of the disease, or in other words that infantile biliary cirrhosis is a variant of infantile scurvy. It is true that boiled cow's milk or some kind of artificial food deficient in vitamins may form the infant's diet when the mother's milk is not available, or becomes deficient in quantity or

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the redundant portion of the sac in the inguinal wound is freed and excised and the operation finished as is the usual radical operation.

quality, from pregnancy or some other cause, but, clinically, infantile biliary cirrhosis is quite different from Barlow's disease. Also, Mukherji's experiments with boiled milk on young guinea-pigs do not tend to support this view. Others believe that vitamin deficiency may operate through the mother, in the first place, by interfering with the normal development of the endocrine system of the foetus and later, in the post-natal period, by depressing her mammary secretion. If such a handicapped child is overfed after birth, infantile biliary cirrhosis results. Other suggested causes, such as the deficiency of fat and sugar in the cow's milk on which the infant is fed, deficiency of vitamins in cow's milk due to the poor quality of the animal's fodder, and excess of sugar content in the mother's milk, are mentioned here, if only to show how divergent are the views about the aetiology of the disease.

Mukherji suggests that infantile biliary cirrhosis may be the expression of an overworked and exhausted liver, as a result of gross overfeeding or feeding with unsuitable diet. Early administration of starchy food may also play a rôle according to this observer. The history of these cases very often reveals dietetic irregularities, such as irregular feeding, too frequent feeding and feeding with unsuitable articles of diet, such as overboiled cow's milk, undiluted cow's milk, or rich and farinaceous delicacies. Also the infant is fed as often as it cries. All these lead to overfeeding. Early conception of the mother and consequent early weaning are antecedent conditions in many instances. Again, in not a few cases the mother may have some disease or her food may be unbalanced and defective in quality. In all these circumstances artificial feeding is begun too early when the child is still very young. It is doubtful if overfeeding on an excessive carbohydrate diet alone can cause cirrhosis of the liver. Probably dietetic irregularities play a part, but not the sole part, in the aetiology of the disease.

Another theory advanced is that infantile biliary cirrhosis is due to a toxic irritation of the liver. The toxins are either transmitted through the mother's milk, or formed and absorbed from the child's gastro-intestinal tract. It is true that the liver is a very important detoxicating organ and constitutes the first line of defence against the toxins absorbed through the portal channel; but if the oncoming toxin is in massive doses this toxophylactic mechanism is very likely to break down. There is evidence of irritation as shown by the pathological changes of degeneration of the liver cells and proliferation of the connective tissue. This view has been refuted on the ground that irritants absorbed through the portal circulation usually cause a multilobular cirrhosis and not an intralobular cirrhosis and that the same cause does not give rise to different pathological changes in the same organ. This refutation does not take into consideration the nature and the

conditions of action of the irritant, nor the age factor which substantially modifies the type and the degree of tissue response. Also, the infant with its peculiar anatomy and physiology shows a greater susceptibility to the disease-causing agencies than the adult.

Probably there are two factors operating, one, a gastro-intestinal toxæmia resulting from an early faulty feeding, and the other, a congenitally insufficient liver with inadequate defence powers. The liver, as mentioned above, serves a very important antitoxic function, and if this is below par any toxic agent reaching the organ becomes relatively more potent. The digestive system of the infant is not adapted for utilizing adult diet. Faulty diet may cause a mild gastro-intestinal disturbance, easily curable in the beginning. The disturbance may be in the form of an imperfect digestion or a perverted digestion. The normal flora of the intestines may become abnormal in the altered surroundings or there may be a fresh invasion of the gut by some pathogenic organisms. Products of abnormal digestion and bacterial activity are liberated and absorbed in massive quantities. For a time the liver meets the situation and does not bring the intoxication into symptomatic prominence, but eventually it breaks down. It is conceivable that in some infants the organ is functionally defective, either because of some developmental error or some hereditary tissue inferiority. Heredity cannot be ruled out on the ground that the onset of the disease is only a few months after the birth. The inferiority may be in the parenchyma, in the reticulo-endothelial system, or in both. This latter system is being recognized more and more as a very important defence mechanism. Some abnormality in the vascular system or nerve supply of the organ as a possible background is also worth considering. It is also conceivable that there is a deficiency of some hitherto undetected antitoxic secretions of the liver.

None of the theories mentioned above satisfactorily accounts for the causation of the disease and the fact remains that the true nature of the aetiology has yet to be unravelled. Detailed studies and observations on the epidemiology of the disease may probably shed further light on this point.

Pathology.—The abdomen is enlarged, usually more in the right hypochondrium. The liver is enlarged and smooth, and as contraction sets in the anterior edge becomes thin and sharp. Jaundice appears early and gives a 'direct delayed' van den Bergh reaction, pointing to an early damage of the liver cells. The early derangement of the liver function is also shown by an early positive lævulose tolerance test. The spleen is enlarged. Towards the end ascites appears with prominent abdominal veins and other signs of portal obstruction. Œdema of the lower extremities is present in the advanced stages. Blood culture may be positive in many cases, probably due to secondary invasion.

B. faecalis alkaligenes, *B. lactis aerogenes*, or *B. coli* has been isolated in several instances. A tendency for hyperglycaemia without glycosuria has been reported by some observers. There is marked anaemia in the advanced cases with a lowered fragility of the red cells. Leucocytosis with a high lymphocytic count is a feature of the second stage, but the normal blood picture in infancy and early childhood, it must be remembered, is markedly lymphocytic in character. The ascitic fluid is clear and is only a transudate. It is deeply bile-stained. The urine is scanty and high coloured. It is acid in reaction and the specific gravity varies. Bile and urobilin are present in varying amounts according to the stage of the disease.

The pathological anatomy was studied by Gibbons (1891). The liver is enlarged and of normal shape in the early stages. It is still larger than normal and normal in shape even after contraction has set in. The organ is smooth in the early stages, but later shows a finely-reticulate yellowish appearance and a thinned out anterior edge. There is no evidence of perihepatitis or thickening of the capsule at any stage, but thickening of the capsule without any evidence of perihepatitis has also been reported. The cut surface is pale, granular and fairly tough in the early stages, but as the disease advances it becomes deeply stained, granular and very tough in consistency. The gallbladder is shrunken and the common bile duct is patent. The former contains, in advanced cases, a small quantity of pale gelatinous mucus in no respect resembling normal bile. Microscopically, there is evidence of early irritation of liver cells as shown by the cloudiness and granularity of the protoplasm and the multiplication of the nuclei. The columnar arrangement of the liver parenchyma is being lost as it is cut off into irregular groups by the proliferating intercellular connective tissue. The young fibroblasts are loosely arranged while there is no particular localization within the lobule for this proliferative process. The degenerative changes in the parenchyma seem to be primary and the connective tissue proliferation is in the nature of a replacement fibrosis. The portal sheaths also show proliferative changes as evidenced by the round-cell infiltration and the multiplication of blood vessels. Fibrous strands are seen extending a short distance between the lobules also but not encircling them. The intercellular fibroblastic reaction is not due to an extension inwards of the changes without, as happens in true biliary cirrhosis, but precedes the latter. Formation of new bile ducts in the newly-formed interlobular connective tissue is also discernible from the early stages. In the advanced cases the normal arrangement of the liver cells is almost lost. In many places the islets of liver parenchyma are completely replaced by a structureless debris while at others the liver cells are in an advanced stage of degeneration, as evidenced by the granularity of the

protoplasm, the contained pigment particles, and oil globules. Here and there, there may be a few healthy cells. The newly-formed connective tissue has increased in amount and matured into firm fibrous tissue. The fibrous tissue between the lobules now completely encircles each lobule. Proliferation of bile capillaries is a well-marked feature of this stage and is seen not only in the portal areas but also within the lobules where the liver cells have degenerated and disappeared. This feature in the pathology of the disease is regarded by Gibbons as a natural attempt at repair and regeneration of the liver parenchyma, a view originally suggested by others in the case of biliary cirrhosis. Gibbons regards the liver condition as a type of biliary cirrhosis. But as the primary changes are in the liver cells and the other changes are only secondary, Mukherji and others consider that Gibbons' view is untenable and that the condition cannot be termed a real biliary cirrhosis. They suggest the name 'intercellular hepatic cirrhosis of infants' for the disease.

The spleen is enlarged during the contracting stage. Its reaction presents the appearance of passive congestion. The kidney may show evidence of parenchymatous nephritis. Enlargement of the lymphatic glands is not noticed.

Symptoms.—The onset is insidious and the disease is fairly advanced by the time something has aroused the suspicion of the parents that all is not well with the child. During this initial stage the child is active enough and takes its food as usual. It may even show a voracious appetite. An occasional vomiting or slight nausea is not such an uncommon feature of infancy as to cause any suspicion. Nothing gives a clue for diagnosis in this stage. A slight puffiness round the eyes and swelling about the ankles on waking up in the mornings may be looked for in the early stages as suspicious of the disease. So also a deposit when the urine passed by the child has evaporated off.

The second stage begins with noticeable enlargement of the upper part of the abdomen. The appetite is impaired or there may be a depravity of appetite, the child eating all sorts of things and craving for all kinds of sweets. Nausea and vomiting increase in frequency and intensity. Constipation becomes worse and persistent. An intelligent mother may have also noticed a loss of normal colour of the stools. The child is thirsty, feverish, more and more irritable and sleepless. Burning sensation of the hands and feet may be complained of by older children. Diagnosis is made mostly in this stage which, in a good number of cases, is by accident when the doctor is called in for some other complaint. On examination, a uniform and painless enlargement of the liver is noticed. The organ is firm and hard with a smooth surface. Rounded and prominent, the lower margin may reach the umbilicus or even beyond. The spleen may or may not be palpable in this stage. Prominent veins are seen on the abdomen. A

slight yellow discoloration of the conjunctivæ may be noticed. There is no emaciation, but a peculiar muddy complexion of the skin is a marked feature. Low irregular fever is a feature of this stage, the temperature rising towards night, but seldom beyond 100°F. Sometimes there may be only a morning rise. The temperature may be irregular, intermittent, or low remittent in type. The cause of this fever has been variously explained as being due to gastro-intestinal upset, auto-intoxication, or secondary blood infection. The motion is white and offensive. Now and again it may show slight colour varying with the liver condition. Microscopically, there are many fat globules, undigested debris, and a seething bacterial flora. Urine is scanty and high coloured, acid in reaction and of varying specific gravity. Casts are rare, but degenerating leucocytes and epithelial cells are present almost always. A catheter specimen may grow organisms, which may or may not have been excreted by the kidneys. Anæmia is not marked, but the leucocytes are increased in number, 12,000 to 20,000 per c.mm., with a lymphocytic predominance. The van den Bergh reaction is 'delayed direct' and liver efficiency tests show damage. Bronchitis, broncho-pneumonia, or enteritis may complicate the course of the disease and may even end the scene. This stage lasts from three to six months.

Third stage: In this stage the liver has begun to contract, and, as the contraction advances, evidence of portal obstruction supervenes. Oedema begins to appear and the superficial abdominal veins become prominent. Anasarca and effusion into serous cavities are then added to the picture. The contraction of the liver may be associated with pain, and its margin becomes sharp and well marked. The spleen is very much enlarged. Jaundice is deepening and the skin is intensely yellow, dry and irritating. Emaciation is not apparent. Urine is scanty and yellow. Constipation continues unless there is a complicating enteritis. Stools are large, offensive and white. Anæmia is marked and leucocytosis continues. There may be hyperglycæmia but no glycosuria. Respiratory complications may appear as in the second stage. Temperature may be high, 102° or 103°F. or even higher, irregular, hectic or even continuous. Hæmorrhages, when they occur, are terminal and take place into the gastro-intestinal tract, the genito-urinary tract or the skin. In one case the vomited material was pure blood. In the majority of cases death is due to cholæmia, the child losing interest in the surroundings, becoming more and more apathetic, drowsy and finally comatose. The type of coma is peculiar in that it resembles natural sleep as was described in adult cirrhosis by Rowntree (1930). Sometimes convulsions precede death. Rarely death may be due to profound cachexia or to some intercurrent disease.

Diagnosis.—Diagnosis is seldom made in the early stage, a history of infantile liver in other

children of the family, the age of the patient—between 6 months and 2 years, the insidious onset, the painless enlargement of the liver, the leucocytosis, the persistent constipation and clayey stools, the irregular fever, the subicteric tinge of the conjunctivæ, and the sallow complexion all form a definite syndrome, which, in the absence of evidence of other diseases, gives a clear ground, in the second stage, to arrive at a correct diagnosis. In the third stage, in addition to the above, the presence of enlargement of the spleen besides the liver, the signs of portal obstruction, the deepening jaundice, the offensive white stools, and the scanty bile-containing urine make the diagnosis easy.

It has to be distinguished from a number of conditions. The infant liver is quite palpable normally and weighs proportionately more than the adult liver.

Congenital syphilis.—Infantile biliary cirrhosis can be differentiated from this by the negative Wassermann test in the patient and the parents, the absence of stigmata of congenital syphilis in the child, the uniform enlargement of the liver instead of the irregular enlargement of syphilis, and the absence of fever.

In catarrhal jaundice the enlargement of the liver is slight, the organ is tender and soft, jaundice appears early, preceded generally by symptoms of acute gastro-intestinal catarrh or some acute infection such as influenza, and the jaundice disappears rapidly under treatment.

Rickets is not common in Indian children and there are distinguishing bone changes in it.

Kala-azar is not common in children under three years, the enlargement of the spleen is greater and earlier in this condition, and leucopenia is the rule.

Malaria does not present any serious difficulty; its sudden onset, high fever coming on in paroxysms, enlargement of the spleen, and the positive blood findings make it easy.

In familial acholuric jaundice several members of the same family may be affected at the same time and there is enlargement of both the liver and the spleen presenting real difficulty; but there is no bile in the urine, while there are positive blood findings with increased fragility of the red cells, and the disease runs a chronic course marked by remissions and exacerbations.

In von Jaksch's anæmia, the spleen is enormously increased in size; there is no jaundice and the blood shows a severe grade anæmia and myelocytes. It is also a disease of the poorer classes.

Other conditions.—As a disease entity, Hanot's cirrhosis does not exist according to Hurst, and, even if it does, it is an exceedingly rare condition, occurring in older children, running a very chronic course, and at intervals showing exacerbations of temperature with deepening of the jaundice and increasing pain over the liver area. Other conditions such as downward displacement of the liver, giardiasis, Gaucher's

disease, and amyloid disease do not really confuse the diagnosis.

Prognosis.—There is a general belief, even among the laity, that the prognosis is gloomy. This seems to be an extreme view; the prognosis depends upon the stage at which the disease is recognized. Mukherji gives a death rate of 63 per cent, but it is probable that some of the cases that have been reported as cured were those of congenital syphilis in which condition treatment with mercury is very much more effective. If untreated, the disease runs its fatal course in 3 to 18 months, with 6 weeks and 2 years as the outside limits. Earlier onset, a more rapid course, jaundice, and œdema are all unfavourable. An early diagnosis and treatment before the liver has begun to contract offer the best chance.

Treatment.—Probably the disease can be prevented to a large extent by the careful dieting and hygiene of the mother during pregnancy and the lactation period, and of the infant when it is weaned. Efficient treatment of the mother for any disease during pregnancy or afterwards is called for in any case. Some observers regard the administration of liver extract in the early stages of pregnancy as a prophylactic.

No treatment is of any avail in the advanced stages. If the case is seen early, change the surroundings completely and remove the child to a wet nurse. If a wet nurse is not available substitute good cow's milk, properly humanized. Goat's milk and ass's milk are said to be more suitable for the infant. Feeding must be regular and in moderate amounts. Milk must be supplemented with orange or lemon juice daily in half-ounce doses well diluted in water. Plenty of sunshine and open air are very important. With early and efficient treatment recovery may take place in 6 to 10 weeks.

Hydrargyrum cum creta in $\frac{1}{2}$ to 1 grain doses, according to age, may be given as an adjuvant treatment. It must be freshly prepared. *Kalmegh* is an old indigenous drug used in this disease. It is a powerful hepatic stimulant and probably regenerative. It also relieves the constipation. To be effective, fresh extract must be given three times daily in doses of 5 to 20 drops according to age, and well diluted in water. *Liquor kalmegh* co., which contains some of the other hepatic stimulants as well, is also well spoken of. Extract of liver is advocated both for the mother and the patient. Vegetable cholagogues such as taraxacum, ipecacuanha, or rhubarb are said to be good.

Saline purgatives or glycerine enemata are called for in obstinate constipation. Œdema may be relieved by saline purgatives. Mercury preparations, such as salyrgan, are not advisable on account of the kidney condition. Paracentesis of the abdomen is better avoided, unless the pressure symptoms are very distressing.

Short clinical descriptions of six illustrative cases, all of which ended fatally, are given below:—

Summary of case reports

Case 1.—A Hindu female child, 9 months old, was seen with fever and enlargement of the abdomen of 2½ months' duration. Case history revealed a lack of appetite from the 6th month, with subsequent onset of wasting and swelling of the abdomen; there was constipation from the 7th month the patient passing whitish stools occasionally, and fever for 3 days in the 8th month. She was the first child and her diet consisted of the mother's milk supplemented with Nestle's milk food and arrowroot jelly. There was no irregularity in feeding nor overfeeding. The parents belonged to the upper class and were lacto-vegetarians and teetotalers. They were healthy and denied any history of syphilis. Their diet, as detailed by them, seemed to have no deficiency of vitamins in it. The mother suffered from bad nausea and vomiting throughout her pregnancy period.

The child did not show any constitutional deformity, but was slightly wasted and inactive; the temperature was 101°F. and the pulse slightly accelerated, the conjunctivæ were yellow, and the skin of an earthy hue, and the abdomen was uniformly enlarged. The liver was palpable reaching the umbilicus, rather hard and smooth, but not tender. The spleen also was palpable. The urine was staining the napkin yellow and the motion was pasty, clayey, offensive and without any macroscopic blood or mucus. Her condition grew worse with marked evidence of portal obstruction appearing in the 10th month. She died in her 11th month. General anasarca developed a week before death, and hæmatemesis and hæmaturia in the last 24 hours. The temperature continued to oscillate between 99°F. and 105°F. till a few hours before death.

Case 2.—A Hindu male child, aged 17 months, with swelling of the abdomen of 5 months' duration. He was apparently healthy for the first 6 months. Irregular fever, occasional sleeplessness and vomiting, loss of appetite, constipation and whitish motions were the points of interest in the case history. The child's urine used to leave on the floor a whitish deposit after evaporation. He was the second child, the first having died on the third day after birth. The parents were non-vegetarians, teetotalers and from the lower middle class. Both were healthy and gave no history of syphilis; the mother was then 2 months' pregnant. Mother's milk formed the child's food with the addition of boiled and diluted cow's milk from the 7th month.

A subicteric tinge of the conjunctivæ, a muddy complexion, puffy face, swollen eyelids, uniform enlargement of the abdomen with distended veins and everted umbilicus and oedematous shiny lower extremities constituted the clinical picture. A soft systolic murmur at the apex and basal crepitations in the lungs were present. The liver and the spleen were uniformly enlarged, hard and smooth, but not tender, the former extending 3 inches and the latter 2 inches below the costal arch. There was free fluid in the abdomen. The motion was bulky, semi-solid, white and very offensive; the urine was dark yellow in colour. The child went slowly downhill and died at the 24th month in spite of all kinds of treatment.

Case 3.—This was a Brahmin male child of 14 months age, with swelling of the abdomen of 9 months' duration, a slight yellow colour of the conjunctivæ and the skin, fever and cough. Save for a capricious appetite, constipation and occasional fever, the history was not important. He was the 6th child of the father and first of the mother. All the 5 children by the first wife were alive and well. The parents came from the upper middle class, were healthy and denied any history of venereal disease. The mother was then 5 months pregnant. Because of the insufficiency of her milk the

child was also getting sago jelly from the second month. There was much irregularity in feeding.

The child was undersized, thin and emaciated; it had a distended abdomen with prominent veins and splayed out costal margins. Oedema round the ankles was noticeable. The temperature was 100.5°F. and there were signs of mild bronchitis. Both the liver and the spleen were smooth and palpable, the former 4 inches and the latter 3 inches below the ribs. The stools were semi-solid, white and offensive, and the urine scanty and intensely yellow. The child lingered on for 6 weeks more, broncho-pneumonia developing a few days before the end.

Case 4.—The younger sister of the above patient came under observation for fever at the 9th month and was cured. As a precaution this child was getting fresh diluted cow's milk instead of sago jelly. Three months afterwards, the child was again seen, this time with a suspicious enlargement of the abdomen. The liver was palpable 1½ inches below the costal margin, but the spleen was not felt. The child died at its 13th month with intense jaundice, a markedly enlarged abdomen and anasarca.

Case 5.—It was a male child, 16 months old, showing a uniform distension of the abdomen, oedema of the lower extremities, fever and jaundice. The abdominal swelling was of 5 months' duration; it had had jaundice and oedema for 3 weeks and fever for 5 days. The patient's motions had been abnormal in colour from birth. Failing appetite, irregular fever, sallowness of complexion, peevishness, sleeplessness and slight loss of flesh were the points in the history. He was the first child of Indian Christian parents, belonging to the upper middle class. The husband was the maternal uncle of the wife. The latter's constitution was delicate and she had had an abortion at the 4th month of pregnancy. She had plenty of milk and the child was also getting orange juice daily. No irregularity of feeding, nor overfeeding was reported.

The temperature was 100.5°F. and pulse 116. Signs of a decompensated liver were already there. The liver and the spleen were enlarged and there was no tenderness nor pain. The blood was anæmic with a high white cell count, the small lymphocytes forming 41 per cent. The Wassermann reaction on the patient as well as the parents' blood gave negative results. The aldehyde (kala-azar) test and the agglutination test against dysentery organisms were also negative. The pasty white motion showed many fat globules, undigested debris, bacteria and a few yeast-like cells. The dark-green urine contained urobilin and bile pigments, and the deposit phosphate crystals, a few epithelial cells and many non-motile bacilli. *B. lactis aerogenes* was grown from the urine. The child's condition got worse and he died after 2 months.

Case 6.—A one-year-old female child of a middle class Brahmin family was brought with swelling of the abdomen of 5 months' duration. She was the second child, and the first and the third were still alive and healthy. The points of interest in this case are that from its birth the child was getting, every other day, castor oil with small doses of a bazar medicine containing mercury, and after the appearance of the swelling the child was given a *kalmegh* preparation for three months and later intravenous antimony. The blood was watery, anæmic and showed no parasites. There was a leucocytosis with 57 per cent neutrophils, 37 per cent lymphocytes, 2 per cent large mononuclears, 2.5 per cent eosinophils, 1 per cent myelocytes and 0.5 per cent mast cells. The Wassermann reaction and the agglutination test were negative. There was a trace of albumin in the urine from which *B. fecalis alkaligenes* was isolated. The condition of the patient became worse and worse, and she died in her 14th month.

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STUDIES ON THE ACTION OF QUININE IN MONKEY MALARIA

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KLIGLER and Mer (1931 and 1933) have called attention to the relationship between host immunity and chemotherapeutic efficacy of chinoplasmine in malaria and this relation probably applies to other antimalarial drugs also. They have suggested that the therapeutic value of a drug should be checked by its effects on children below 6 years of age as they are less capable of developing a resistance or immunity to malarial parasites than those above this age. There may, however, be difficulties in the way of carrying out such tests. It has been shown that the plasmodium in monkeys, *P. knowlesi*, produces a very intense and virulent infection in *Silenus rhesus*, causing death of the animal, if untreated. For this reason this animal is very well adapted for testing the therapeutic activity of antimalarial remedies and has been used by the authors for this purpose for the last two years. Chopra, Mukherjee and Campbell (1933) tested the antimalarial properties of eotarnine derivatives and found their results equally applicable to plasmodium infection in man. The present authors extended

(Continued from previous column)

All the above cases were from places with no indigenous kala-azar and in each case malaria could also be ruled out. In none of them were there any signs of congenital heart disease, hereditary syphilis, rickets or tuberculosis.

Acknowledgment

It is with pleasure that I admit that the writing of this paper was prompted by my friend Dr. Radhakrishna Rao, M.B., B.S., Research Scholar of the Andhra University.

REFERENCES

- Castellani, A., and Chalmers, A. J. (1919). *Manual of Tropical Medicine*. Baillière, Tindall & Cox, London.
- Gibbons, J. B. (1891). The Morbid Anatomy of a form of Biliary Cirrhosis in Children in India. *Scientific Memoirs by Medical Officers of the Army of India*, part VI, p. 51.
- Mukherji, S. K. (1922). *Infantile Cirrhosis of Liver*. Indian Medical Record Book Department, Calcutta.
- Rowatree, L. G. (1930). Certain Clinical and Terminal Pictures in Hepatic Disease. *Med. Clin. North America*, Vol. XIII, p. 1399.
- Sen, B. C. (1887). Enlargement of the Liver in Children. *Indian Med. Gaz.*, Vol. XXII, p. 338.

the use of this animal to chemotherapeutic studies with other drugs.

In a previous paper (1933) we have recorded the results of our investigation on the effect of atebirin on plasmodium infection in this hyper-susceptible host. It was shown that the destructive action of atebirin on this plasmodium was exceptionally powerful. Usually two doses of 0.025 gm. of the drug given intramuscularly or intravenously are sufficient to control a very heavy infection which may amount to a million parasites per c.mm. The drug equally affects both the schizogony and the gametogony, and all phases of parasites rapidly disappear from the peripheral circulation under its action. Even after a single dose, signs of degeneration are seen in the parasites and their numbers rapidly decrease (see figures 1 and 2). After two or three

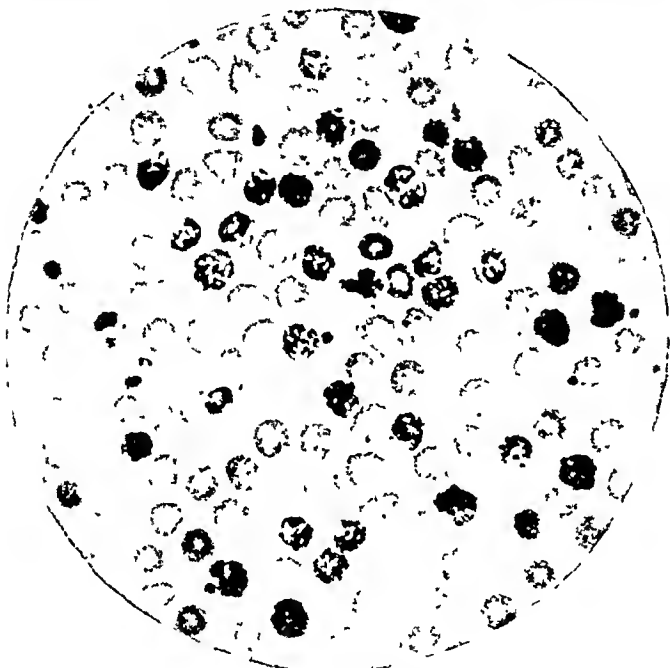


Fig. 1—Blood film from a monkey showing a count of 882,000 parasites per c.mm. immediately before an injection of atebirin.

doses they disappear from the peripheral blood altogether. Owing probably to its slow excretion atebirin, when given intravenously, appears to exert a prolonged action. The drug is absorbed equally well and is effective whether given by the intravenous or intramuscular route, and there appears to be no marked difference in its action whatever mode is adopted. We have noted, however, that although the drug cures a very intense infection with marvellous rapidity, the parasites reappear in the blood between 10 and 15 days after a course of intensive treatment with large doses of the drug for 5 days. These parasites multiply in the blood with the same rapidity as in the primary attack, and cause death of the animal if prompt treatment is not given. The recrudescence can, however, be checked much more easily than the original attack. One dose of the drug as a rule suffices to control the multiplication of parasites though a low grade of infection may persist for long periods. In our series of human cases

(mostly adults), a similar relapse, within such a short period after the treatment, did not occur so frequently.

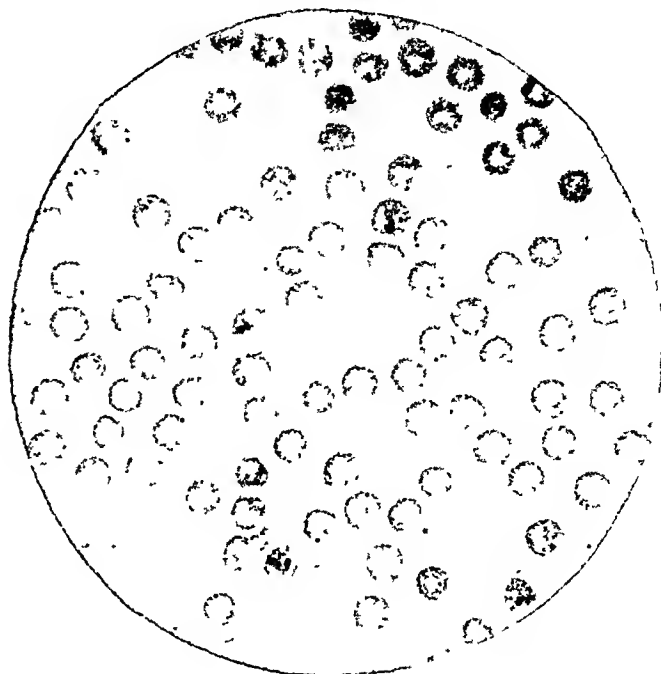


Fig. 2—Blood film of a monkey taken 22 hours after an injection of atebirin, shows that the count has come down to a negligible number and the parasites still present are all showing signs of degeneration.

In this paper we propose to give the results of our investigation regarding the effect produced by quinine on this plasmodium. Our object was to determine the relative effectiveness of quinine and atebirin on this plasmodium, and secondly to determine the comparative efficacy of the drugs given by the intramuscular and intravenous routes. The animals used in our experiments were all *Silenus rhesus* because of their ready availability and convenient size. These were infected in the usual way by subcutaneous injections of heavily parasitized blood from another monkey of the same species previously infected. The weight of the animals usually ranged between 3 to 5 kilogrammes. In most cases the treatment was commenced when the infection was heavy, the maximum being over a million parasites per cubic millimetre of blood.

In the following tables detailed observations on these animals continued for many months are recorded:

No. I, *Silenus rhesus*, 2.647 kilogrammes in weight inoculated with 0.5 c.cm. of blood containing 90,000,000 parasites (rings and schizonts). Incubation period 6 days.

Date	Parasite count per c.mm.	Treatment	REMARKS
3-1-33	Very scanty rings.	..	..
4-1-33	10,400	..	Rings, growing trophozoites and schizonts.

No. I, *Silenus rhesus*—concl'd.

Date	Parasite count per c.mm.	Treatment	REMARKS
5-1-33	148,000	Quinine 1½ grs. i.v.	Chiefly rings.
6-1-33	174,000	Do.	Chiefly schizonts. Had convulsions immediately after the injection.
7-1-33	200,000	Do.	Very severe convulsions lasting over 15 minutes within a minute after injection.
8-1-33	178,000	Quinine 1½ grs. i.m.	Basophilia, anisocytosis and pigment-bearing mononuclears.
9-1-33	128,480	..	Chiefly degenerating trophozoites. Abnormal cells, basophiles and normoblasts.
10-1-33	Scanty	..	Degenerating.
12-1-33	15,200	..	Marked basophilia.
13-1-33	8,200	..	..
15-1-33	Scanty rings	..	..
21-1-33	Do.	..	Marked anisocytosis and basophilia.
23-1-33	Very scanty rings.	..	..
24-1-33	No parasites	..	No parasites seen in 250 microscopic fields examined.
1-2-33	Do.	..	..
18-2-33	Scanty rings	..	No abnormal cells, red cell count 4,840,000 per c.mm.
19-2-33	No parasites	..	..

The blood examined on the 27th February, 7th, 18th and 28th March, 18th April, 17th and 26th July, 10th August and 26th October showed no parasites. On the last day of examination the red cell count was 5,120,000 per c.mm.

Quinine in doses of 1½ grains intravenously produced convulsions and appears to be too large for a monkey weighing 2½ kilogrammes. As the daily dose of 1½ grains intravenously produced practically no effect on the parasite count, an intramuscular injection of the same dose was given, after which the count came down gradually. A low grade of infection, however, persisted for about 40 days. After that period parasites had not been detected in smears examined on 10 occasions, the last being done on 26th October, 1933. This monkey was under observation for more than 10 months.

No. II, *Silenus rhesus*, 3.46 kilogrammes in weight, inoculated with 0.2 c.cm. of blood containing 110,800,000 parasites (rings and schizonts). Incubation period 13 days.

Date	Parasite count per c.mm.	Treatment	REMARKS
6-2-33	85,000	Quinine 1½ grs. i.v.	Schizonts and a few gametocytes.
7-2-33	68,480	Do.	..
8-2-33	12,400	Do.	..
9-2-33	Scanty	Do.	Growing trophozoites.
10-2-33	+ (no count)	..	Do.
11-2-33	Do.	..	Do.
13-2-33	Do.	..	Do.
14-2-33	Scanty	..	..
18-2-33	+ (no count)	..	..
20-2-33	Do.	..	..
21-2-33	Very scanty	..	Schizonts.
22-2-33	No parasites	..	..

Examinations made on the 27th February, 7th, 18th and 28th March, 18th and 21st April, 17th July, 10th August and 26th October showed no parasites.

In this animal the treatment was started when the count was not high, i.e., less than 100,000 parasites per c.mm. After the treatment, the count showed a slow and gradual decrease, and the animal had no relapse and apparently recovered. This monkey was under observation for more than 9 months.

No. III, *Silenus rhesus*, 4.155 kilogrammes in weight, inoculated with 0.5 c.cm. of blood containing 62,000,000 parasites (all rings). Incubation period 8 days.

Date	Parasite count per c.mm.	Treatment	REMARKS
13-3-33	++ (no count)	..	Rings and schizonts.
14-3-33	348,000	Quinine 1½ grs. i.v.	Chiefly rings.
15-3-33	680,000	Do.	..
16-3-33	700,000	Do.	..
17-3-33	1,036,000	Do.	..
18-3-33	46 per cent r.b.c.'s infected.	..	Extremely anæmic; monkey died at night.

In this animal treatment was started when the count was fairly high. In spite of the daily intravenous injection of the maximum doses of quinine, the parasites went on increasing in number and ultimately killed the animal.

No. IV, *Silenus rhesus*, 3.825 kilogrammes in weight. Incubation period 8 days.

Date	Parasite count per c.mm.	Treatment	REMARKS
1-5-33	6,820	Quinine 1½ grs. i.v.	Rings and schizonts. Severe convulsions within 5 minutes after the injection.
2-5-33	80,280	Quinine 1 gr. i.v.	..
3-5-33	46,200	Do.	..

No. IV, *Silenus rhesus*—concl'd.

Date	Parasite count per c.mm.	Treatment	REMARKS
6-5-33	No parasites	Quinine 1 gr. i.v.	..
10-5-33	Do.	..	..
29-5-33	+ (no count)	..	..
17-7-33	Do.	..	..
26-7-33	Scanty parasites.	..	Rings.
14-8-33	No parasites	..	..
15-8-33	Do.	..	..
17-8-33	..	..	Died of pneumonin.

Post-mortem examination showed consolidation of large areas of both the lungs. No parasites were detected in the heart blood.

In this animal, treatment was started on the very day the parasites were first detected in the blood smear. Though the count showed no increase in the number of parasites for a couple of days, it came down gradually and eventually the parasites disappeared altogether.

No. V, *Silenus rhesus*, 4.1 kilogrammes in weight, inoculated with 0.25 c.cm. of blood containing 17,060,000 parasites. Incubation period 4 days.

Date	Parasite count per c.mm.	Treatment	REMARKS
22-5-33	++ (no count)	..	Growing trophozoites and schizonts.
23-5-33	420,000	Quinine 1½ grs. i.v.	..
24-5-33	820,000	Do. (11-30 A.M.)	..
		Do. (3 P.M.)	..
25-5-33	1,100,000	Do. (1 P.M.)	..
		Do. (4-20 P.M.)	..
26-5-33	28,280	..	Degenerated growing trophozoites.
29-5-33	Scanty	Quinine 1½ grs. i.v. (4-20 P.M.)	Basophilia and normoblasts.
30-5-33	+ (no count)	Do.	Pigmented leucocytes.
1-6-33	Do.	..	..
2-6-33	++ (no count).	..	Schizonts, Normoblasts, basophiles and pigmented leucocytes.
7-6-33	Scanty	..	Schizonts.
8-6-33	+ (no count).	..	Gametocytes.
13-6-33	No parasites	..	..
21-6-33	Do.	..	A few pigmented leucocytes.
23-6-33	Scanty	..	Schizonts.
24-6-33	Do.	..	Trophozoites and schizonts.
17-7-33	No parasites	..	..

Examinations were made on the 26th July, 10th and 18th August, 19th September, and 26th October with negative results. The red cell count on the last day of examination was 5,650,000 per c.mm.

In this animal 24 hours after the first injection of quinine the count was graded. As one dose intravenously per day was effective in reducing the

number of parasites, it was decided to give two injections at an interval of 3½ hours so as to ensure the presence of quinine in the blood for longer periods. The injections were repeated at the same interval on the following day also. The parasite counts came down and the monkey gradually recovered.

A monkey of 4 kilogrammes in weight cannot stand a dose of over 1½ grains, given intravenously, but the same dose can be safely repeated after 3½ hours. Intravenous administration of quinine twice a day appears to be effective in eradicating even a heavy infection. This monkey was under observation for over six months.

No. VI, *Silenus rhesus*, 4.565 kilogrammes in weight, inoculated with 0.5 c.cm. of blood containing 80,000,000 parasites. Incubation period 4 days.

Date	Parasite count per c.mm.	Treatment	REMARKS
13-10-33	Scanty	..	..
14-10-33	+++ (no count)	..	..
16-10-33	1,240,000	Quinine 1½ grs. i.v.	..
17-10-33	1,880,000	Do.	..
18-10-33	..	..	Died at night. Heart blood full of parasites.

No. VII, *Silenus rhesus*. This monkey weighing 4.5 kilogrammes was infected 4 times during the period from August 1931 to 25th November, 1932, and treated with small doses of quinine from time to time to produce a condition of chronicity of infection. On 7th August, 1933, the monkey was inoculated for the fifth time with 0.5 c.cm. of blood containing 29,140,000 parasites, without any response. On 30th August, 1933, another injection was given of 1.5 c.cm. of blood containing 29,140,000 parasites, but this also gave negative results. It may be mentioned that one-sixth of this dose is sufficient to produce infection under normal conditions.

On 14th October, 1933, a still bigger dose, amounting to 2 c.cm. of blood from a heavily infected animal, was given. After an incubation period of 11 days the parasites appeared but the rate of multiplication was definitely slow as compared with a monkey with primary infection. This monkey was under observation for more than two years.

Date	Parasite count per c.mm.	Treatment	REMARKS
26-10-33	Scanty	..	Rings.
27-10-33	Do.	..	Do.
30-10-33	18,240	..	Rings and schizonts.
1-11-33	24,820	Quinine 1½ grs. i.m.	{Rings, schizonts and gametocytes. Animal looks ill; no inclination for food.
2-11-33	Scanty parasites.	Do.	Looks better.
3-11-33	No parasites	Do.	..
4-11-33	Do.	Do.	..
6-11-33	Do.	Do.	..

No. VIII, *Silenus rhesus*, 3.75 kilogrammes in weight, inoculated with 0.25 c.cm. of blood containing 31,000,000 parasites. Incubation period 5 days.

Date	Parasite count per c.mm.	Treatment	REMARKS
13-3-33	++ (no count)	..	Rings and schizonts.
14-3-33	84,280	Quinine grs. ii, i.m.	Do.
15-3-33	27,200	Do.	Do.
16-3-33	No parasites	Do.	..
17-3-33	Do.	Do.	..
20-3-33	Do.	..	..
21-3-33	Do.	..	..
22-3-33	Do.	..	..
28-3-33	+ (no count).	..	Rings and schizonts.
29-3-33	+ (no count).	..	Schizonts.
31-3-33	Scanty	..	Do.
14-4-33	No parasites	..	..
18-4-33	Scanty	..	Rings.
21-4-33	No parasites	..	..
1-5-33	Do.	..	..
5-5-33	Do.	..	..
16-5-33	Scanty (no count)	..	Rings.
17-5-33	++ (no count)	..	Schizonts and gametocytes.
19-5-33	No parasites	..	..
13-6-33	Do.	..	..
17-7-33	Do.	..	..
15-8-33	Do.	..	..
19-9-33	Do.	..	..
26-10-33	Do.	..	Red cell count 5,120,000 per c.mm.

In this animal, parasites were not very numerous when the treatment was commenced. The count came down to nearly a third of the original number 24 hours after the first injection and no parasites could be found after two injections. But they appeared in scanty numbers from time to time for about two months. Since that time the blood has been negative on 5 monthly examinations.

On the 26th October, 1933, when the monkey was examined last, it looked quite healthy showing a total r.b.c. count of 5,128,000 per c.mm. This monkey was under observation for more than seven months.

No. IX, *Silenus rhesus*, 3.580 kilogrammes in weight, inoculated with 0.5 c.cm. of blood containing 42,140,000 parasites. Incubation period 7 days.

Date	Parasite count per c.mm.	Treatment	REMARKS
22-3-33	A few	..	Rings.
23-3-33	564,000	Quinine 1½ grs. i.m.	Rings and schizonts.
24-3-33	590,400	Quinine grs. ii, i.m.	Chiefly growing trophozoites.
25-3-33	Very scanty	Do.	Degenerating. Pigmented leucocytes present.
26-3-33	Scanty	Do.	Degenerating.
28-3-33	No parasites	..	..
29-3-33	Do.	..	..
31-3-33	+ (no count).	..	Schizonts.
3-4-33	++ (no count).	..	Rings and schizonts.

No. IX, *Silenus rhesus*—concl'd.

Date	Parasite count per c.mm.	Treatment	REMARKS
11-4-33	No parasites	..	..
18-4-33	Scanty	..	Schizonts.
21-4-33	No parasites	..	..
27-4-33	Do.	..	..
1-5-33	Do.	..	..
5-5-33	Do.	..	..
16-5-33	+ (no count).	..	Growing trophozoites.
18-5-33	+ (no count).	..	Do.
19-5-33	No parasites	..	Basophilia present.
17-7-33	Do.	..	..
18-8-33	Do.	..	..
26-10-33	Do.	..	..

In this animal a slight increase of the count was noticed after the first injection, but 24 hours after the second injection the count was negligible and the parasites were mostly degenerating. Scanty infection persisted for about two months; after that period the animal appeared to be free. The last examination of blood was made about 4 months after the last appearance of the parasites. This animal was under observation for more than seven months.

No. X, *Silenus rhesus*, 3.490 kilogrammes in weight, inoculated with 0.5 c.cm. of blood from a heavily infected monkey. Incubation period 6 days.

Date	Parasite count per c.mm.	Treatment	REMARKS
3-4-33	+ (no count)	..	Rings and schizonts.
4-4-33	1,742,000	Quinine grs. ii, i.m.	Chiefly rings.
5-4-33	1,296,000	Do.	Growing trophozoites.
6-4-33	401,200	Do.	..
7-4-33	Scanty	..	Degenerating, basophiles and normoblasts, etc.
8-4-33	No parasites	..	..
9-4-33	Do.	..	..
17-4-33	..	..	Died. Post-mortem examination showed innumerable parasites in the heart blood.

In this animal parasites apparently disappeared after a course of 4 injections, but they reappeared and multiplied with great rapidity and killed the animal 10 days after the last dose. Here quinine behaved like atabrin in its action on the monkey plasmodium.

No. XI, *Silenus rhesus*, 5.4 kilogrammes in weight, inoculated with 0.4 c.cm. of blood from a very heavily infected monkey. Incubation period 8 days.

Date	Parasite count per c.mm.	Treatment	REMARKS
5-7-33	++ (no count).	..	Rings, growing trophozoites, and schizonts.
6-7-33	++ (no count).	..	Rings and schizonts.

No. XI, *Silenus rhesus*—concd.

Date	Parasite count per c.mm.	Treatment	REMARKS
8-7-33	+++ (no count).	..	Rings, growing trophozoites and schizonts.
9-7-33	52,240	Quinine grs. ii, i.m.	Do.
10-7-33	48,620	Do.	Trophozoites mostly degenerating.
11-7-33	No parasites	Do.	..
12-7-33	Do.	Do.	Marked anisocytosis.

Blood examined on the 13th, 17th and 26th July, 10th and 26th August, 10th and 19th September and 26th October showed no parasites.

Treatment was started fairly early. After a course of 4 injections the parasites disappeared altogether, and were never found during a period of three months.

No. XII, *Silenus rhesus*, 3 kilogrammes in weight, inoculated with 0.5 c.cm. of heavily infected blood. Incubation period 4 days.

Date	Parasite count per c.mm.	Treatment	REMARKS
13-7-33	605,000	Quinine grs. ii, i.m.	Chiefly rings (see figure 3).
14-7-33	1,500,000	Do.	Rings and schizonts.
15-7-33	1,644,000	Do.	..
17-7-33	25,200	Do.	Trophozoites degenerating.
18-7-33	Very scanty	Do.	Very marked basophilia, normoblasts and marked anisocytosis.
22-7-33	No parasites	..	..
26-7-33	Do.	..	..
10-8-33	Very scanty	..	Rings.
16-8-33	No parasites	..	..
2-10-33	Do.	..	..
23-10-33	Scanty	..	Rings.
26-10-33	No parasites	..	..

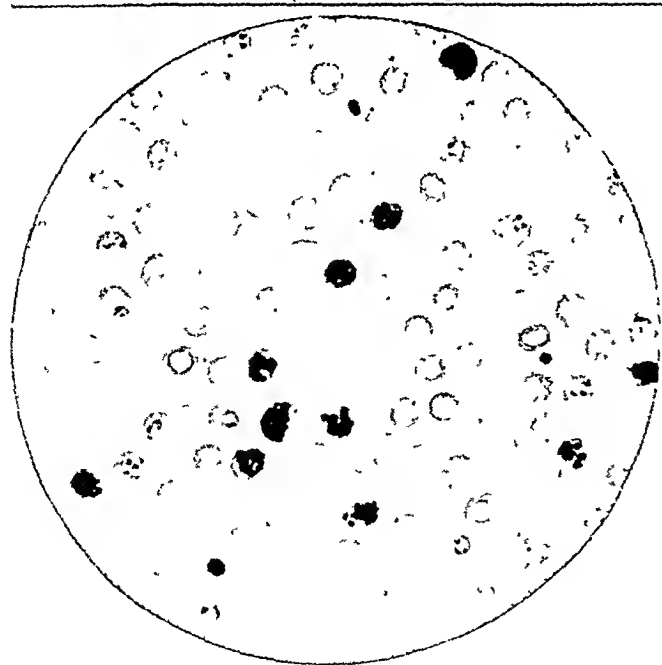


Fig. 3.—Blood film of monkey XII taken immediately before quinine was administered, showing a count of 605,000 parasites per c.mm.

Parasites continued to increase in number even after 2 injections (see figure 4), but were scanty after four injections. Low grade of infection, however, persisted for three months.

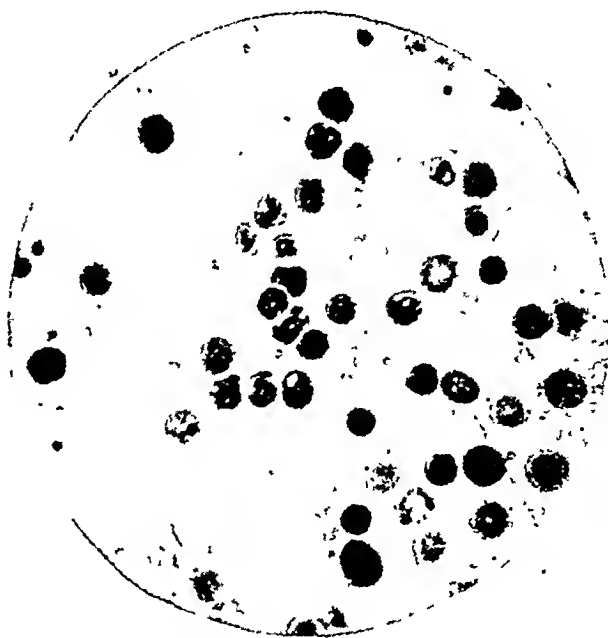


Fig. 4.—Blood film of monkey XII taken 24 hours after an injection of quinine showing an increase in the number of parasites and diminution of red cells. Parasites 1,500,000 per c.mm. Red cells 2,100,000 " "

Four months after the completion of treatment the monkey developed a severe relapse and died. Smears of heart blood showed an infection of very severe intensity, nearly 80 per cent of red cells being infected.

No. XIII, *Silenus rhesus*, 3 kilogrammes in weight, inoculated with 0.4 c.cm. of blood containing 82,000,000 parasites (chiefly rings). Incubation period 5 days.

Date	Parasite count per c.mm.	Treatment	REMARKS
19-7-33	Very scanty	..	..
20-7-33	+ (no count).	..	Rings.
21-7-33	300,480	..	Chiefly rings.
22-7-33	2,016,000	Quinine grs. ii, i.m.	Rings, schizonts and a few gametocytes.
23-7-33	1,203,200	Do.	Chiefly schizonts, r.b.c. 3,760,000 per c.mm.
24-7-33	98,600	Do.	Chiefly trophozoites, r.b.c. 3,280,000.
25-7-33	6,960	Do.	Trophozoites. Anisocytosis, basophilia and demilune cells, r.b.c. 3,280,000.
26-7-33	No parasites	Do.	R.b.c. 3,580,000.
10-8-33	Do.	..	R.b.c. 5,620,000.
2-10-33	Do.	..	..
26-10-33	Do.	..	..

In this animal injection was started when the count was exceptionally high, more than 50 per cent of r.b.c. being parasitized. Parasites disappeared after the fourth injection. The animal was under observation

for about three months after the course of treatment during which period occasional examinations of its blood were made, but no parasites could be detected.

No. XIV, *Silenus rhesus*, 4,320 kilogrammes, inoculated with 0.25 c.cm. of blood containing 75,120,000 parasites (rings only). Incubation period 4 days.

Date	Parasite count per c.mm.	Treatment	REMARKS
26-7-33	+	..	Rings, r.b.c. 5,610,000 per c.mm.
27-7-33	17,280	..	R.b.c. 4,820,000 per c.mm.
28-7-33	774,400	Quinino grs. ii, i.m.	R.b.c. 4,840,000 per c.mm.
29-7-33	921,600	Do.	R.b.c. 3,560,000 per c.mm.
30-7-33	24,000	Do.	Parasites degenerating, r.b.c. 2,000,000 per c.mm.
31-7-33	Very scanty	Do.	Marked anisocytosis, basophilia, achromia and normoblasts, r.b.c. 2,200,000 per c.mm.
1-8-33	No parasites	..	R.b.c. 2,320,000 per c.mm.
10-8-33	Scanty	..	Rings, r.b.c. 5,840,000 per c.mm.
16-8-33	+	..	Schizonts and gametocytes.
28-8-33	Scanty	..	Rings.
17-9-33	No parasites	..	..
26-10-33	+	..	Schizonts.

After the first injection the count showed a little increase, but after two injections it came down considerably. A low grade of infection persisted for nearly three months.

No. XV, *Silenus rhesus*, 4,689 kilogrammes in weight, inoculated with 0.5 c.cm. of blood containing 103,600,000 parasites (chiefly mature schizonts). Incubation period 8 days.

Date	Parasite count per c.mm.	Treatment	REMARKS
9-9-33	Scanty	..	Rings and schizonts, r.b.c. 5,640,000.
11-9-33	800,000	Quinine grs. ii, i.m.	Rings and schizonts, r.b.c. 4,000,000.
12-9-33	72 per cent r.b.c. infected.	Do.	R.b.c. 1,120,000.
13-9-33	..	..	Monkey died.

This animal showed a hyper-susceptibility to the infection. In spite of a full dose of quinine given intramuscularly, the count went up from 800,000 to 2,880,000 per c.mm.—a condition hardly compatible with life.

No. XVI, *Silenus rhesus*, 4,630 kilogrammes in weight, inoculated with 1 c.cm. of blood containing 800,000,000 parasites (schizonts and rings). Incubation period 4 days.

Date	Parasite count per c.mm.	Treatment	REMARKS
16-9-33	10.2 per cent cells infected.	Quinine grs. iii, i.m.	Chiefly rings, r.b.c. 5,840,000.
17-9-33	18.5 per cent cells infected.	Do.	All schizonts, r.b.c. 4,460,000.
18-9-33	42.1 per cent cells infected.	Do.	R.b.c. 3,280,000. Animal very ill.
19-9-33	19.9 per cent cells infected.	..	R.b.c. 2,480,000.
20-9-33	0.3 per cent cells infected.	..	..
25-9-33	No parasites	..	..
2-10-33	+++ (no count)	Quinine grs. iii, i.m.	Rings, growing trophozoites and schizonts.
3-10-33	+	Do.	Rings and schizonts.
5-10-33	No parasites	..	..
9-10-33	Do.	..	Died. Post-mortem examination next day showed innumerable parasites in the heart blood.

To ascertain if larger doses of quinine would produce a quicker effect on the parasite count this animal was given a dose of grs. 3 per diem. The site of the inoculation was so much inflamed that we had to stop the injections for a time after the third. Two more injections were however given after the inflammation had subsided.

It will be seen that the effect of large doses was far less than with smaller doses. This is probably due to the damage of the tissue caused by large doses and consequent interference with proper absorption of the drug.

Discussion

A perusal of the tables will show that in monkeys I to VI quinine was administered intravenously, while in monkeys VII to XVI it was given by the intramuscular route.

Dosage.—Monkeys weighing between 3 and 4 kilogrammes can stand a dose of $1\frac{1}{2}$ grains of quinine intravenously, if administered very slowly, but a larger dose, 2 grains, usually causes death of the animal. Even with a dose of $1\frac{1}{2}$ grains the animal may get convulsions immediately after the injection which may not be fatal (monkeys I and IV). By the intramuscular route 2 grains dissolved in 1.5 c.cm. of water can be given without any untoward symptoms. A dose of 3 grains, however, dissolved in the same amount of water produces inflammation of the part injected which is so severe that it becomes difficult to give a second injection in the same area for many days. The last-mentioned dose is not only irritating to the tissues, but is also far less effective than

a two-grain dose, probably owing to the drug not being properly absorbed from the damaged tissues (monkey XVI). The number of injections given were 3 to 5, as compared with five days' treatment with atebtrin.

Intravenous series.—In our previous paper (1933) we have recorded that on this plasmodium atebtrin has an almost equally effective action whether it is given by the intravenous or by the intramuscular route. The state of affairs is somewhat different with quinine. After one intravenous or intramuscular injection of atebtrin the number of parasites in the peripheral blood showed a remarkable fall; in the case of quinine the parasites showed a distinct increase after the first and the second injection; this is clearly brought out throughout the intravenous series (monkeys I to VI). We attributed this to a more rapid excretion of quinine when given by the intravenous route so that the contact of the drug with the parasites is of shorter duration than in the case of atebtrin. In monkey V, therefore, in order to maintain contact for a longer period, two intravenous injections of quinine at an interval of about 3 to 4 hours were given; even after this the parasites in the peripheral circulation steadily increased in number. It was on the third day of administration that there was a definite and remarkable decrease in their number. In the case of atebtrin, one injection whether intravenous or intramuscular brought down the parasites to a negligible amount. These experiments clearly indicate that quinine administered by the intravenous route has a decidedly slower action on this plasmodium than atebtrin, and after the administration of the drug is started, sufficient time may elapse to allow the parasites to multiply and produce death of the animal (monkeys III and VI). In fact it would appear that the first intravenous injection of quinine in these animals not only was ineffective in stopping parasite multiplication but actually stimulated it. In plasmodium infection in man we have also observed a similar increase in the number of parasites after an intravenous injection of quinine (Chopra *et al.*, 1932).

A study of tables I to VI will show that unless the injections are started fairly early in the infection, administration of quinine by this route is ineffective. If, however, the intravenous injections are repeated at short intervals, say of 4 or 5 hours, even a heavy infection, *i.e.*, about half a million per c.mm., can be controlled (monkey V).

Intramuscular series.—We have already referred to the marvellous effect produced by intramuscular injections of atebtrin on this plasmodium. The parasites circulating in the peripheral blood are rapidly destroyed after one injection, their number shows a considerable decrease and degeneration sets in in the body of the parasite almost immediately. If quinine is administered when the parasite count is low

(monkeys VIII and XI) the infection can be quickly brought under control after one injection, but if the count is about half a million or more (monkeys IX, X, XII, XIII and XIV) two or three intramuscular injections are necessary to get the infection under control. The intramuscular injections of quinine, like the intravenous injections, appear to have a more gradual action on the parasites and there is as a rule no remarkable decrease in their numbers for 24 hours after injection or even longer.

Comparative effects of atebtrin and quinine

A careful study of the action of atebtrin and quinine on this plasmodium shows that atebtrin has a much more powerful immediate effect on the parasites than quinine. Even when the parasite count in the peripheral blood is high, *i.e.*, about half a million per c.mm., one dose of atebtrin brings down the number and controls the infection. In the case of quinine one dose, intramuscular or intravenous, is only effective when the parasite count is low, *i.e.*, below 100,000 per c.mm. When the count is high, *i.e.*, above half a million, 2 or 3 injections are necessary to control the infection. The difference, however, in the remote effects of the two drugs on the infection is remarkable, so far as the reappearance of parasites in the blood and the virulence of the relapse is concerned; whereas after 5 days' intensive treatment with atebtrin in large doses, the parasites invariably reappeared in 10 to 15 days and multiplied with the same rapidity as in the primary attack, causing death of the animal if prompt treatment were not given, in the case of quinine often the parasites did not reappear in the blood (monkeys XI and XIII) and if they did appear (monkeys VIII, IX, XII and XIV) they were scanty in number, did not multiply and did not produce death of the animal. In this relapse the parasites often disappeared spontaneously without treatment, or a very low grade of infection persisted, as was the case in the atebtrin series, only after the treatment of the relapse with the drug. In only two animals (monkeys X and XII) was death produced after relapse, whereas after a full course of atebtrin the first relapse, if untreated, was practically always fatal.

The conclusion which can be drawn from these observations is that, although the immediate effect of quinine on the plasmodium infection is not so remarkable as atebtrin, this alkaloid has a more lasting action and has a stronger effect in eradicating the infection, so that either the parasites disappear from the peripheral blood altogether or if they reappear they cannot multiply rapidly (as after atebtrin) and produce death of the animal. It may be pointed out here, that treatment with atebtrin increases the susceptibility of the parasite to the action of this drug, as with one dose of the drug a very severe relapse that would otherwise end fatally can be successfully treated and the infection controlled.

So far as the relative efficacy of intravenous and intramuscular injections of quinine on this plasmodium is concerned, it is evident from these experiments that there is not much to choose. If anything, the effect of the former would appear to be less powerful and less lasting than of the latter. Two factors are concerned in the destructive action of the drug on the parasites, i.e., firstly concentration of the drug and, secondly, its duration of contact. So far as the concentration is concerned, an intravenous injection must produce, for the time being at any rate, a higher concentration in the peripheral blood than an intramuscular injection; the quinine given by this route, however, is very rapidly excreted so that the maintenance of this concentration is probably of much shorter duration than in the case of the intramuscular route, in which a constant supply of the drug is maintained for some time from the site of injection; the contact is therefore longer following intramuscular injections than following intravenous, and this may account for the great efficacy of the former. Acton and Chopra (1924) showed that quinine can be detected at the site of injection for at least 24 hours after injection.

These experiments bear out the contention of Acton and Chopra (1927) that very small concentrations of quinine may stimulate the growth of the plasmodium.

Possibility of the development of resistance or immunity to infection

During the course of acute infection the number of red blood corpuscles fell from about $5\frac{1}{2}$ millions per c.mm. (normal count) to about two millions or even less. But it is surprising that the animal regains its normal count in about 10 days after a course of treatment.

The question of immunity produced in malaria has been discussed largely in the literature of late years and the evidence is gradually accumulating in favour of its production. In this connection the case of monkey VII is worth notice. This animal was under observation for over two years after his first infection with the plasmodium from which he was saved by treatment with quinine. Since then it has been given very large doses of the plasmodium; on the first two occasions it failed to take the infection at all, but on the third the parasites appeared after a delayed incubation period and the rate of multiplication was markedly slow as compared with a monkey with a primary infection.

Summary

It is fully realized that the series of animals on which these observations have been made is very small, but as the monkeys have to be kept under observation for many months and the examinations are laborious the difficulty of

doing a larger series can be understood. It is not, therefore, claimed that the results obtained are of universal application but they help in understanding the effect produced by these drugs on this plasmodium. This paper is a continuation of our previous paper (1933) and should be read along with it.

Our observations show that the action of quinine on this plasmodium is slower than that of atebirin. If the treatment is started at the time when the infection is moderately heavy, the parasite count does not seem to be affected in most cases for 24 hours or even longer with quinine whereas with atebirin, even if the treatment is started late, i.e., when the count exceeds half a million parasites per c.mm., this invariably falls to a negligible number (see figures 1 and 2). After a 3 or 4 days' course of treatment with quinine, a low grade of infection may persist even up to a period of 3 months and after that period it usually dies out. But rarely a monkey may suddenly show a very rapid multiplication of the parasite followed by death of the animal if left untreated. On the other hand after a full course of atebirin the parasites disappear from the peripheral circulation for 10 or 15 days and after this period reappear and multiply with very great rapidity, so much so that the animal dies in two or three days if treatment is not started immediately. The parasites appearing during the relapse are very susceptible to the action of atebirin and one dose suffices to control the infection.

The intramuscular injections of quinine appear to be somewhat more efficacious than intravenous and their effect seems to be more lasting. Some evidence has also been produced to show that resistance or immunity is produced against this infection in monkeys.

REFERENCES

- Acton, H. W., and Chopra, R. N. (1924). The Local Effects Produced in the Tissues by Intramuscular Injections. *Indian Journ. Med. Res.*, Vol. XII, p. 251.
- Acton, H. W., and Chopra, R. N. (1927). The Action of Quinine on the Malarial Parasites. *Trans. Seventh Congress, Far Eastern Assocn. Trop. Med.*, Vol. II, p. 814.
- Chopra, R. N., and Das Gupta, B. M. (1933). Studies on the Action of Atebrin in Plasmodium Infection of Monkeys. *Indian Med. Gaz.*, Vol. LXVIII, p. 493.
- Chopra, R. N., Das Gupta, B. M., and Sen, B. (1932). A Fatal Case of Severe Malignant Tertian Malaria. *Indian Med. Gaz.*, Vol. LXVII, p. 680.
- Chopra, R. N., Mukherjee, B., and Campbell, H. G. M. (1933). The Pharmacological Action and Antimalarial Properties of Anhydrocotarnine-Resorcinol-Hydrochloride (A Derivative of Narcotine). *Indian Journ. Med. Res.*, Vol. XXI, p. 255.
- Kligler, I. J., and Mer, G. (1931). Studies on Malaria. Relapse Rate After Quinine-Plasmoquine Treatment. *Trans. Roy. Soc. Trop. Med. and Hyg.*, Vol. XXV, p. 121.
- Kligler, I. J., and Mer, G. (1933). The Development of Immunity against Malaria in Children under Ten Years of Age. *Trans. Roy. Soc. Trop. Med. and Hyg.*, Vol. XXVII, p. 269.

THE PLACE OF TREATMENT IN AN ANTIMALARIAL CAMPAIGN

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INTRODUCTION

THE practice with which this paper deals is situated in Upper Assam, near the North Eastern Frontier, and comprises ten tea gardens owned by five companies, one company having five gardens, one company two, and three companies one each. The district is bisected by a river, and the areas occupied by the gardens abound in river-flood plains, in broad and narrow plains on which rice is grown in the

From November to April the minimum temperature is below 65°F. and few infected mosquitoes are found. During May conditions are very variable. It may be a hot dry month—maximum temperatures of 102°F. have been recorded—or there may be a fairly high rainfall as during 1932.

The rains or monsoon season commences about mid-June, and from this time until mid-October, the maximum and minimum temperatures are practically constant. The absolute and relative humidities are both high, as the average rainfall is in the neighbourhood of 20 inches monthly.

The following table gives the temperatures, etc., for 1932 :—

TABLE I

Month			TEMPERATURE		HUMIDITY				Rainfall inches
			Max.	Min.	Relative		Absolute		
					9 A.M.	3 P.M.	9 A.M.	3 P.M.	
January	..	..	70.9	50.3	89.13	59.65	4.59	4.67	2.17
February	..	..	71.8	50.5	81.87	52.10	4.41	4.20	2.62
March	..	..	80.1	57.8	77.08	51.73	5.41	5.39	4.64
April	..	..	84.5	64.1	72.54	52.95	6.42	6.33	5.08
May	..	..	82.1	69.7	84.97*	73.37*	7.74*	8.12	16.82*
June	..	..	87.3	75.0	88.31	75.78	9.47	9.12	24.27
July	..	..	90.8	75.9	82.32†	66.87†	9.47	9.81	19.37
August	..	..	87.7	75.9	87.69	72.03	9.37	9.68	18.84
September	..	..	87.1	74.6	86.39	70.77	9.24	9.81	19.28
October	..	..	84.2	69.2	82.94	67.82	7.98	8.01	3.53
November	..	..	78.2	61.8	89.37	69.20	6.75	6.94	3.84
December	..	..	71.7	52.0	88.66	64.91	4.91	5.42	1.99

Note.—Relative humidity given in percentages.

Absolute humidity given in grains per cubic foot.

* Abnormally high.

† Abnormally low.

In 1932 May was an abnormally wet month, the rainfall being the highest for at any rate 12 years.

rains when they are flooded, and in water channels of various kinds, some dry in the cold weather and some containing water throughout the year. In some places undrained swamps are still to be found.

The climate is sub-tropical, and there are two main seasons, a cold dry one, and a hot wet one. The former is characterized by a greater daily range of maximum and minimum temperatures, by considerably lower rainfall, and consequently lower humidity, both relative and absolute. The latter is characterized by smaller daily range of maximum and minimum temperatures, by high rainfall and consequently higher average humidity.

The area was surveyed by a malarialogist during 1924, and an antimalarial officer, experienced in antilarval methods, was left by him to supervise the carrying out of the recommendations made, which he has continued to do until now.

As regards treatment, from 1924 till 1930 all cases of 'fever' were admitted to hospital, and when the diagnosis of malaria was made, the fever was controlled as quickly as possible by the administration of quinine, and when the temperature had remained normal for a few days, the patient was discharged to a 'challan' on which for three months adults received ten grains of quinine in liquid form daily, and

children according to age. During 1925 all children of seven years and under received a daily dose of equinine in milk, but this was done during one year only.

In 1930, when I took charge of the practice, considerable dissatisfaction was being expressed at the lack of results from the enormous expenditure on antimalarial work. Although the spleen rates had been slightly lowered, the companies naturally had been expecting a very obvious improvement in the health of the labour forces, as shown in admissions to hospitals for malaria, and in the death rates.

During that year, 1930, no changes in treatment were made except the limiting of injections of quinine to cases where injection was definitely indicated.

Auxiliary methods.—In 1931 the standard treatment of malaria recommended by Sinton (1930)* was introduced throughout the practice, and all children with enlarged spleens were given quinoplasmochin twice weekly during June, July, and August. Owing to the lack of a laboratory staff, it was impossible to estimate the parasite rate on any garden, but it was considered reasonable to presume that the percentage of gametocyte carriers was high, and that the larger the number of people treated the better. Consequently we encouraged admissions for malaria, and also gave the treatment to many who had enlarged spleens, but who had come to hospital for reasons other than malaria.

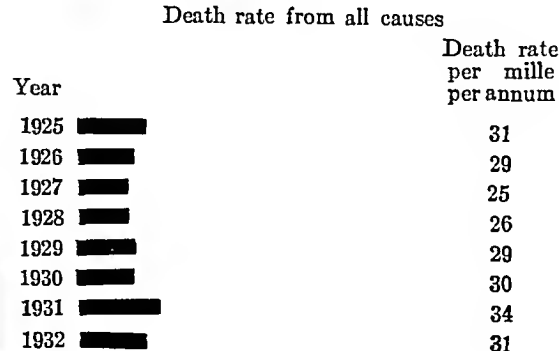
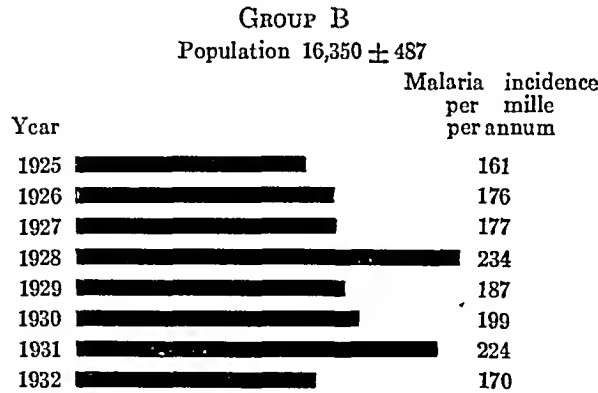
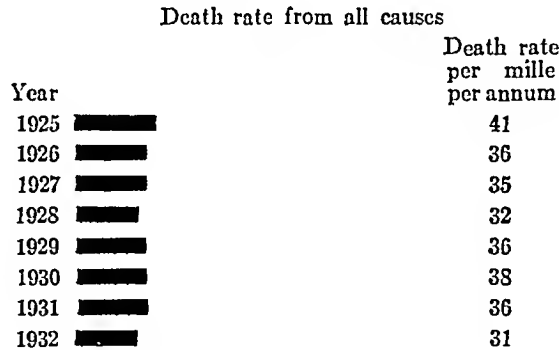
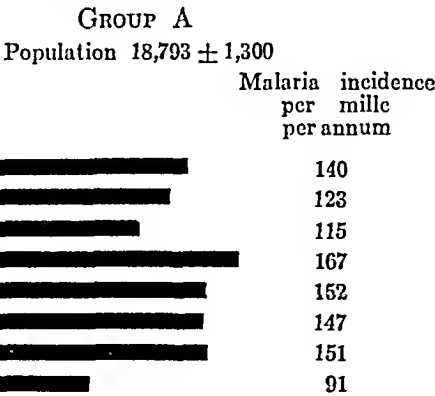
The most important class under this heading was anæmia, secondary in type. For many years anæmia had been so prevalent that the hospital accommodation had been quite inadequate for indoor treatment, and the system adopted was to put all those found with an hæmoglobin index of 50 per cent or under on light work. Those with 40 per cent or less were given a meal in the morning, a dose of iron tonic, and one-third work with full pay. Those with 45 per cent to 50 per cent hæmoglobin were given a meal, a dose of quinine, iron and arsenic tonic, and two-thirds work with full pay. All were treated for hookworm regularly, and progress in most cases was slow.

During 1931 we admitted as many of these cases as possible to hospital for a 'Sinton' treatment, and the result in many cases was wonderful. The hæmoglobin index rose steadily, and it was possible to discharge many to full work immediately the course was finished. In others a subsequent short course of iron tonic treatment was necessary.

The standard treatment was not popular with the labour forces or with the managers, chiefly because of the length of stay in hospital required. Accordingly this was changed in 1932 to the treatment recommended by Knowles (1931)†, and, as an experiment, all the children in one

line per garden were given plasmochin once daily for six days each alternate week for six months.

Results.—The following diagrams show the results up to 1930 and for 1931 and 1932. Group A represents the company with five gardens, and Group B the five gardens owned by the other four companies.



* This consists of 210 grains of quinine, preceded by alkalis, and 0.105 gramme of plasmochin, spread over a period of a week.—EDITOR, I.M.G.

† This consists of 200 grains of quinine, preceded by alkalis, and 0.06 gramme of plasmochin, spread over a period of 10 days, the plasmochin being given in daily doses of 0.01 gramme during the last six days.—EDITOR, I.M.G.

At little more than a glance one can see that the position in 1930 as regards admissions was worse than in 1925, and as regards deaths very little better.

During 1932 we reaped the benefit of the work done in 1931. In group A the malarial incidence was less than for any of the other years shown, and the death rate from all causes was also less. In group B the incidence was the lowest since 1925, the death rate being much the same as in other years.

Results of plasmochin treatment of children

In the lines chosen for giving plasmochin to the children there had been a high malarial incidence previously. In the population of the five lines in group A the malarial incidence had been 170 per mille in 1930, and 190 per mille in 1931. In 1932 it was 104 per mille.

In group B the incidence had been 293 per mille in 1930, and 323 per mille in 1931. In 1932 it was 200 per mille.

Re-treatments

A certain percentage of patients who have been treated once had to undergo a second course of treatment. These percentages are given below:—

TABLE II

	Group A	Group B
1931	10.92	32.78*
1932	13.63	24.96

* One garden in this group had to give up curative treatment in the rains, on account of lack of hospital accommodation.

Many of these may have been reinfections as *Anopheles minimus*, the carrier here, were caught in large numbers, not as an antimalarial measure, but for dissection: one insect collector on each garden was employed for this purpose.

The mosquito catches are given below:—

TABLE III

	Group A	Group B
1931	5,500	9,696
1932	5,230	7,968

TABLE IV

Mosquito (*A. minimus*) dissections

	Number dissected.	Number infected.	Per cent infected.
1929 September—December	879	17	1.9
1930 May—November	549	13	2.4
1931 May—November	1,239	45	3.6

Total admissions to hospital

In this connection, an important factor other than malaria must be mentioned. Steam-milled rice, deficient in vitamin B complex has been gaining popularity steadily with the labour forces, and only at the beginning of 1933 was sufficient interest aroused for attention to be given to this important factor in predisposing to disease.

TABLE V

	Total admissions per mille	
	Group A	Group B
1930	400	514
1931	425	588
1932	367	489

To keep the labour forces up to strength, considerable recruiting is necessary every year. Had any change been made in 1932, for instance had more so-called 'immunes' to malaria been imported that year, it might have been said that therein lay the reason for the improvement. But no change was made.

Conclusion.—No doubt the ideal solution of the malaria problem in Assam would be the elimination of the carrier mosquito, but until effective practical measures are devised, and prove effective, it appears that here, where conditions are ideal for the breeding of *A. minimus*, and for the development of the parasite in the mosquito, auxiliary antigametocyte measures are essential for the achievement of even a limited success.

I am indebted to the Directors for permission to publish this article and to the scientific department of the companies for the table of temperatures, humidity and rainfall.

REFERENCES

Knowles, R. (1931). Clinical Studies in Malaria by cultural and enumerative methods. *Indian Med. Gaz.*, Vol. LXVI, p. 1.

Sinton, J. A. (1930). A Suggested Standard Treatment of Malaria based upon the results of the controlled investigation of over 37,000 cases. *Indian Med. Gaz.*, Vol. LXV, p. 603.

[Note.—We do not believe that the writer meant to criticize antilarval measures in general. There can be no possible doubt that in many places in Assam these measures have been very successful in controlling malaria, in others heavy expenditure has produced little immediate effect. The gardens referred to in this paper appear to fall into the latter category. It seems probable that in these circumstances effective treatment and antigametocyte measures will be necessary to supplement, rather than to replace, the antilarval measures.

In the gardens of group A, the mean of the malarial incidence for the seven years, 1925 to 1931, was 142 and the standard deviation of these seven experiences ± 17 . The figure for 1932 was 91, with a standard deviation ($\sqrt{N.P.Q.}$) of $\sqrt{82.719}$. The standard deviation of the difference of these two figures is therefore $\sqrt{289 + 83}$ or ± 19.3 . Therefore the difference between the mean malarial incidence of the previous seven years and that for 1932, namely $142 - 91 = 51$, is definitely significant, if the methods of collecting the figures were strictly comparable.

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NINE CASES OF HUMAN GNATHOSTOMIASIS

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and

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Up to the present twelve cases of human gnathostome infestation have been recorded in the literature from various eastern countries. During the past few years we have collected nine cases in Bangkok; seven cases have already been mentioned by Prommas and Daengsvang (1933), and two further cases are now added.

Case 1.—Nang P., female, Siamese, store-keeper and housewife, resident of Bangkok, *et. 31*, who was fond of petting cats and did not eat raw meat and vegetables. Family and past histories were not significant. About 6 or 7 years ago she suffered from migrating swellings which appeared on her arms and legs; these were accompanied by slight itching and boring pain, and sometimes by redness. They appeared at variable intervals of weeks or months, varied in size, and frequently subsided after application of tincture of iodine but they usually disappeared spontaneously. The last swelling occurred on the anterior abdominal wall; from this a worm was extracted and she has been free from the condition since.

Parasite.—The worm after fixation measures 9.36 mm. in length and 0.77 mm. in width. The anterior extremity is provided with a pair of trilobate lips and a cephalic bulb which measures 0.25 mm. long and 0.77 mm. wide and is furnished with eight rows of single-pointed spines pointing posteriorly. The eighth row is not yet fully developed. The anterior two-thirds of the body is covered with spines which are broad, tridentate and dense near the broad end that becomes single-pointed and sparse as one proceeds posteriorly. The posterior third of the body is without spines. The posterior extremity forms two cuticular expansions or alæ each supported by four large papillæ. There are two unequal simple spicules. The alimentary system consists of a muscular œsophagus and an intestine. The latter is full of blood and opens into a subterminal anus. There are two pairs of cervical sacs, one on each side of the œsophagus, and are about one-sixth of the body length. The parasite is apparently a nearly full grown male *G. spinigerum*, shrunk to a certain extent after fixation.

Case 2.—Nai Ch., male, Siamese student, resident of Bangkok, *et. 22*, who was very fond of domestic animals, especially dogs and cats, and had the habit of eating raw meat and vegetables. Family and past histories were not important. In October 1929 he

developed a swelling on the right side of his face with slight irritation but without signs of inflammation or fever and he was seen by Professor T. P. Noble, head of the Surgical Department. The swelling persisted till

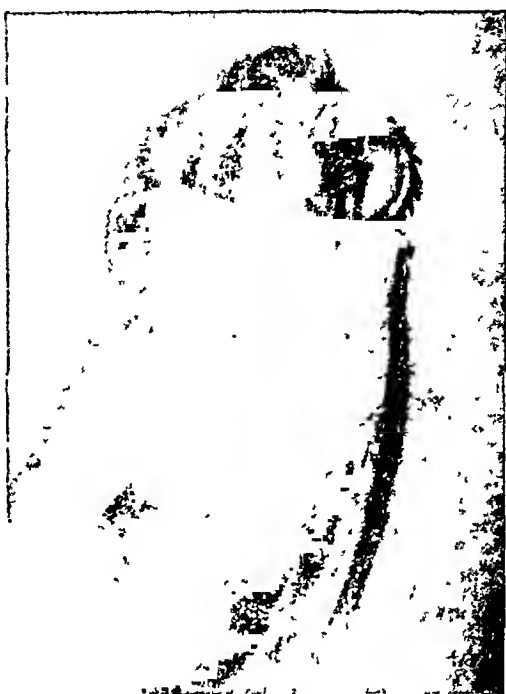


Fig. 1.—Photomicrograph of the head of the parasite in case 2 showing lips, cephalic bulb with eight rows of spines and anterior part of the body thickly covered with spines.



Fig. 2.—Photomicrograph of the tail of the parasite in case 2 illustrating alæ of its posterior extremity.

(Continued from previous page)

However, in group B, the mean of the malarial incidence for the seven years, 1925 to 1931, was 194 and the standard deviation of these seven experiences ± 25 . The figure for 1932 was $170 \pm \sqrt{141}$. The standard deviation of the difference between this figure and the mean is therefore $\sqrt{625 + 141}$ or ± 27.7 . The difference therefore between the malarial incidence of the previous seven years and of 1932 is not significant.

On the other hand if we take into consideration only the cooler lines in which plasmochin treatment of children was given—although the figures are of less value, because the populations are not indicated and the malarial incidences are available for only two years—the figures, such as they are, do suggest a significant improvement in the malarial state of both these sets of lines during 1932.—Error, I.M.G.]

the sixth day on which he felt something penetrating the inner side of the right cheek, and from this place a worm was extracted with a dissecting needle by a friend. After extraction of the worm the swelling gradually disappeared.

Parasite.—The worm is identified as a male *G. spinigerum* which measures after fixation 6.80 mm. long and 0.51 mm. wide. The cephalic bulb is 0.20 mm. long and 0.37 mm. wide and furnished with eight rows of fully-developed single-pointed spines. Its general morphology is identical with that of the worm in case 1, but in addition sets of fine spines are definitely seen on the inner side of the caudal alae.

Case 3.—Nang Ch., female, Siamese, a housewife, resident of Bangkok, *æt.* 34, who was fond of petting cats and gave no history of taking raw food. Family and past histories negative. She had suffered from a creeping swelling for about three years, which varied in size and position, was occasionally accompanied by very severe boring or biting pain and inflammatory symptoms lasting for two or three days. The parts of the body most frequently affected were her arms, legs and abdomen. At each attack there were no more than two swellings. She had been treated with various kinds of native drugs without effect. On 21st June, a tumour, with a severe pain boring or biting in character, about 7.5 cm. in diameter, occurred on the left iliac region. At the centre a minute black spot was observed about the size of a pin-head surrounded by a small red area. It was thought to be an abscess and was pricked with a needle by her husband; a small amount of serous fluid and a living worm were expressed. On the next day the swelling rapidly subsided.

Parasite.—It is a male *G. spinigerum* measuring after fixation 7.20 mm. in length and 0.43 mm. in width. The cephalic bulb is 0.19 mm. long and 0.40 mm. wide and covered with eight rows of single-pointed spines, the eighth row not fully formed. The anterior half of the body is covered with tridentate and simple spines. Its general morphology is identical with that of the worm in case 1.

Case 4.—Nang Ch. L., female, Siamese, a housewife, resident of Bangkok, *æt.* 34, was very fond of petting cats, did not eat raw food, admitted into Siriraj Hospital, 7th July, 1932, on account of labour pains. Family and past histories were unimportant. The history of illness concerning gnathostomiasis was that previous to entry the patient had migrating swellings one at a time on the arms, legs and back for 6 or 7 months. The swelling varied in size, was always accompanied by inflammatory signs, itching sensation and boring or biting pain. Usually the swelling spontaneously disappeared within a few hours or a day and there were variable quiescent intervals. On 13th July, 1932, in the obstetrical ward she developed severe pain at the back of the right ear without any visible lesion for a few hours, and the pain then shifted to the back of the neck, left costal area and inside of the chest respectively, followed by slight irritation in the throat causing her to cough up about 10 c.cm. of bright red blood and a worm; after this the bleeding stopped and the symptoms disappeared. The whole duration was about 36 hours.

Parasite.—It is a male *G. spinigerum* measuring after fixation 4.20 mm. long and 0.77 mm. wide. The head bulb is 0.19 mm. long, 0.34 mm. wide and covered with eight rows of single-pointed spines which are not fully developed on the eighth row. The anterior third of the body is covered with tridentate and simple spines. Other general structure is identical with that of the worm in case 1.

Case 5.—Nang Soa Gn., female, Siamese, a house-keeper, resident of Bangkok, *æt.* 30, who always had cats in the house but gave no history of eating raw food. Her mother once had a creeping swelling which disappeared after extraction of a worm. Another female member of the family was also affected with a similar condition. For two years one patient had migrating swellings with inflammatory signs and slight itching on various parts of the body, these appeared one at a time. There was great variation in the subsiding period and in size. Each attack lasted about 2 to 3 days and usually quickly responded to hot compresses. One year previously she had extracted with a needle a worm from a tumour on her left breast. On

7th July, 1932, there was a slightly painful and tender mass 5 to 7.5 cm. in diameter over the left breast from which on 10th July, 1932, a worm similar to the former one was extracted with a needle by herself, and sent to us. Since then all symptoms disappeared and there was only a small black scab over the wound.



Fig. 3.—Photomicrograph of the tail of the parasite in case 5 showing spicules protruded from the posterior end and the posterior part of the body free from spines.

Parasite.—It is a male *G. spinigerum* measuring after fixation 9.35 mm. in length and 0.34 mm. in width. The cephalic bulb is 0.17 mm. long, 0.37 mm. wide and furnished with eight rows of single-pointed spines; the eighth row is not fully developed. The anterior third of the body is sparsely covered with single-pointed spines. General morphology similar to the worm in case 1.

Case 6.—Nang S., female, Siamese, a housewife, resident of Bangkok, *æt.* 27, who was very fond of petting cats. Family and past histories were unimportant. On 18th July, 1931, she felt fullness, slight itching and a painful sensation in the epigastrium. The itchy sensation spread to the left side of the chest accompanied by a slight diffuse shiny swelling. On the sixth day the left side of the neck was greatly swollen, very itchy and painful. The swelling spread to the chin and caused difficulty in turning the head. On the ninth day there were severe itching and pain at the root of the left ear with frequent forced coughing and expectoration that resulted in an expulsion of a living worm. There was no fever or headache. After expectoration of the worm the symptoms subsided in two or three days.

Parasite.—It is a male *G. spinigerum* measuring after fixation 4.68 mm. long and 0.77 mm. wide. The cephalic bulb is 0.14 mm. long, 0.40 mm. wide and covered with eight rows of single-pointed spines; the eighth row is not fully formed. The anterior third of the body is covered with tridentate and simple spines; general structure similar to the worm in case 1.

Case 7.—Nang L., female, Siamese, a house-keeper, resident of Bangkok, *æt.* 57. Clinical history was not available. The worm was extracted by the patient from a swelling in the left axilla on 26th August, 1932.

Parasite.—It is a male *G. spinigerum* measuring after fixation 4.93 mm. long and 0.85 mm. wide. The cephalic bulb is 0.17 mm. long, 0.43 mm. wide and covered with

eight rows of single-pointed spines; the eighth row is not fully formed. The anterior half of the body is covered with tridentate and simple spines; general structure similar to the worm in case 1.

Case 8.—Nai S, male, Siamese, a clerk, resident of Bangkok, *æt.* 26. Family and past histories in connection with gnathostomiasis were negative. About three months before attending the out-patient clinic of Siriraj Hospital on 21st January, 1933, the patient noticed a painful and itchy swelling on the left side of the abdominal wall, lasting a few days. Later similar swellings occurred successively on the right breast and neck. Examination revealed a superficial hard tumour about 2.5 cm. in size on the neck just below the angle of the right mandible with a reddish cord-like mass at the middle part. There was no enlargement of the cervical lymph nodes. Fæcal examination was negative for intestinal parasites.

Under local anesthesia the tumour was removed 'en masse' by Dr. Lek Sumitra, the surgeon in charge, and

dissection revealed a living worm embedded in the dense, gray, firm tissue.

Histology.—Microscopic examination of the hæmatoxylin-stained sections of the tissue specimen discloses irregular, tunnel-like spaces containing granular pink-staining necrotic tissue and deeply-stained fragments of cellular nuclei. The surrounding connective and adipose tissues are extensively infiltrated with eosinophiles, mononuclear cells, some fibrin and occasional red corpuscles, the first greatly predominating. In the periphery there is perivascular infiltration of small round cells and a few eosinophiles.

Parasite.—It is an apparently full grown male *G. spinigerum* measuring after fixation 6.50 mm. long and 0.85 mm. wide. The head bulb is 0.20 mm. long, 0.34 mm. wide and furnished with eight rows of fully developed single-pointed spines. The anterior third of the body is covered with tridentate and simple spines. During dissection of the tissue the parasite was ruptured and coils of the testes protruded.

Total cases of human gnathostomiasis reported

Author	Year	Number case	Age	Sex	Race	Symptoms	Duration of attack
Levinson ..	1889	1	Adult	Female	Siamese	Breast abscess.	Not available.
Leiper ..	1909	1	Adult	Female	Siamese	Cutaneous node.	Not available.
Samy ..	1918	1	23	Male	Chinese	Swelling of right hand and finger, abscess formation on the right thenar eminence.	1 month.
Tamura ..	1921	1	41	Female	Japanese	Intermittent pricking pain and swelling of right chest.	4 days.
Robert ..	1922	1	27	Female	Siamese	Paroxysmal violent and frequent cough with irritation of pharynx.	1 day.
Robert ..	1922	1	28	Female	Siamese	Migrating swelling of hands and feet with difficult walking. Palpitation. Difficulty of respiration.	8 months.
Robert ..	1922	1	21	Female	Siamese	Hæmaturia. Hæmatemesia, œdema, slight fever and paroxysmal tenacious cough.	1 year.
Morishita ..	1924	1	43	Male	Japanese	Linear swelling of left thenar eminence with continuous pain.	3 days.
Morishita and Faust.	1925	1	26	Male	Japanese	Creeping disease of the right shoulder.	Few days.
Morishita and Faust.	1925	1	Adult	Male	Japanese	..	..
Maplestone ..	1929	1	26	Male	Mahomedan	Migrating swelling with signs of inflammation.	Few days.
Datta and Maplestone.	1930	1	20	Female	Hindu	Bloody discharge from right ear and pain. Sore throat. Simulating mastoiditis.	Few days.
Prommas and Daengsvang.	1934	1	34	Female	Siamese	Migrating swelling with itching and boring pain.	6 to 7 years.
Prommas and Daengsvang.	1934	1	22	Male	Siamese	Swelling of right side of face with slight irritation.	6 days.
Prommas and Daengsvang.	1934	1	34	Female	Siamese	Migrating swelling.	3 years.
Prommas and Daengsvang.	1934	1	34	Female	Siamese	Migrating swelling, itching pain.	6 to 7 months.
Prommas and Daengsvang.	1934	1	30	Female	Siamese	Migrating swelling and inflammatory signs.	2 years.
Prommas and Daengsvang.	1934	1	27	Female	Siamese	Swelling itching, pain and expectoration.	9 days.
Prommas and Daengsvang.	1934	1	57	Female	Siamese	Swelling of axilla.	Not available.
Prommas and Daengsvang.	1934	1	26	Male	Siamese	Migrating swelling with pain and itching.	3 months.
Prommas and Daengsvang.	1934	1	36	Female	Siamese	Itchy swelling.	Not available.

Case 9.—Nang Ch. L., female, Siamese, housewife, resident of Bangkok, *æt.* 36, who had no history of taking raw food. Dogs and cats were petted. Family and past histories were unimportant. The illness began (1933) with a transverse itchy swelling about 15 cm. in length on the anterior wall of the lower part of abdomen, which showed two days later a small reddish nodule about the size of a pea at the middle portion. The itching greatly increased and caused scratching, and on the third day the nodule ruptured, exposing the head of a worm which was extracted. The swelling then subsided and the wound healed in two days. She never had swellings on other parts of the body.

Parasite.—It is a male *G. spinigerum* measuring after fixation 6.50 mm. long and 0.85 mm. wide. The cephalic bulb is 0.20 mm. long, 0.34 mm. wide and furnished with eight rows of single-pointed spines. The anterior two-thirds of the body is covered with tridentate and simple spines. Other general structure is similar to the worm in case 1.

General considerations

We have added nine cases of human gnathostomiasis to the twelve cases previously reported by various authors. These bring the total to twenty-one, of which 14 were found in Siam (Levinsen, 1889, Leiper, 1909, Robert, 1922, Prommas and Daengsvang, 1933), one in Malay States (Samy, 1918), three in China (Tamura, 1921, Morishita and Faust, 1925), one in Japan (Morishita, 1924), two in India (Maplestone, 1929, Datta and Maplestone, 1930). In addition we have seen twenty cases clinically diagnosed as gnathostome infestation one of which was confirmed by extraction of a worm by the patient from the buccal mucosa after suffering from facial swelling for about one week, but unfortunately the patient had thrown the worm away. The disease is apparently confined to oriental countries, and is especially common in Siam. It occurs in both sexes at any age (20 to 57 years). Seven of the twenty-one cases were in males and fourteen in females. Probably both sexes have similar chances of infection.

The disease is ordinarily characterized by a migrating intermittent swelling of varying size which is usually painless but on certain occasions is more or less itchy and painful. Pain if present is boring or biting in character and in rare cases is severe enough to disturb night sleep. The swellings do not show pitting on pressure and underwent suppuration in two cases only (Levinsen, 1889, and Samy, 1918) probably on account of secondary infection. The regional lymph nodes are not involved unless there is added bacterial infection. There is no definite anatomical distribution of the lesions; they are found on the abdominal wall, chest, shoulder, face, hand and foot. In one instance the parasite simulated mastoiditis (Datta and Maplestone, 1930), and in our case 4 it presumably pierced through the tracheal wall producing hæmoptysis. As a rule the blood picture shows eosinophilia of varying degree but this is not a pathognomonic feature since it occurs in many other tropical diseases.

Though nothing is known with certainty regarding the mode of infection and transmission

of the parasite, recently Prommas and Daengsvang (1933) discovered the development of its larval form in a cyclops, and are carrying on further promising experiments, the results of which will be published later.

For treatment of the disease many methods were tried by different authors, for example external application of tincture of iodine, cold and hot compresses, quinine by the mouth and intramuscular injection, etc. None apparently surpass surgical intervention.

Acknowledgment

We thank the staffs of Siriraj Hospital for their co-operation and Dr. K. Chareonvedh and Dr. Luang Visetbhadaya of the Department of Public Health for sending us two specimens.

[*Note.*—In the annual report of the Calcutta School of Tropical Medicine, for 1931, Maplestone reported an additional case to the two cited in this paper. His note on the case is as follows:—

'A third case of infection with an immature gnathostome was seen in a man who had never been out of Bengal. In this instance the escape of the worm was preceded by swelling in the throat, which considerably interfered with swallowing; this was followed by the formation of a furuncle above the right eyebrow accompanied by considerable swelling of the surrounding tissues, causing pressure on the eyeball with protrusion of this organ and disturbance in vision. Finally, the worm escaped near the site of the furuncle on the forehead, and the condition began to subside at once'.
—EDITOR, I.M.G.]

REFERENCES

- Datta, S., and Maplestone, P. A. (1930). Infection by a Gnathostome simulating Mastoiditis. *Indian Med. Gaz.*, Vol. LXV, p. 314.
- Leiper, R. T. (1909). The Structure and Relationships of *Gnathostoma siamense* (Levinsen). *Parasitology*, Vol. II, p. 77.
- Levinsen, G. M. R. (1889). Om en ny Rundorm hos mennesket *Cheiracanthus siamensis* n. sp. *Vidensk. meddel. fra naturh. Foren. i. Kjøbenhavn. f.* 1889, p. 323.
- Maplestone, P. A. (1929). A Case of Human Infection with a Gnathostome in India. *Indian Med. Gaz.*, Vol. LXIV, p. 610.
- Morishita, K. O. R. (1924). A Pig Nematode, *Gnathostoma hispidum* Fedchenko, as a Human Parasite. *Ann. Trop. Med. and Parasit.*, Vol. XVIII, p. 23.
- Morishita, K., and Faust, E. C. (1925). Two New Cases of Human Creeping Disease (Gnathostomiasis) in China, with a Note on the Infection in Reservoir Hosts in the China Areas. *Journ. Parasit.*, Vol. XI, p. 158.
- Prommas, C., and Daengsvang, S. (1933). Preliminary Report of a Study on the Life-Cycle of *Gnathostoma spinigerum*. *Journ. Parasit.*, Vol. XIX, p. 287.
- Robert, P. L. (1922). La Gnathostomose Humaine Œdème Ambulant Siamois du a *Gnathostomum spinigerum* (R. Owen, 1836). *Bull. Soc. Path. Exot.*, Vol. XV, p. 854.
- Samy, P. C. (1918). *Gnathostomum siamense* or *Gnathostoma spinigerum* (Owen). *Indian Med. Gaz.*, Vol. LIII, p. 436.
- Tamura, H. (1921). On Creeping Disease. *Brit. Journ. Dermat. and Syph.*, Vol. XXXIII, p. 81.

BORED-HOLE LATRINES IN THE HEALTH UNIT, PARTABGARH

By KASHI PRASADA, D.P.H.

Medical Officer In-Charge Health Unit, Partabgarh

Introduction

THE work of construction of bored-hole latrines was started by the Public Health Department of the United Provinces in the district of Partabgarh in January 1933. Till the end of September 1933, 313 latrines were installed. The work is being done under the direction and control of the medical officer in charge of the health unit who had made a study of such work in some of the health units in Ceylon.

Area

The work so far has been restricted to the health-unit area, in which health activities on an intensive scale are being carried on with the assistance of the Rockefeller Foundation.

The area forms a portion of the Gangetic plain. The soil is predominantly of clay and free from rocks. Sandy strata occur at some places in the subsoil, while beds of 'kankar' are met with occasionally. The mean annual rainfall is 40 inches and the subsoil water level is 30 to 60 feet below the surface of the earth.

Sites

In selecting sites the two points kept in view were that the latrines should be easily accessible and should be situated at least 50 feet away from wells. The sites of the existing surface privies, courtyards or other places within 30 feet or so of the houses proved quite suitable for the purpose.

I. Boring of holes

Apparatus used—	Price	
Borer (boring bottom) .. Rs.	40-0-0	(approx- imately)
Shaft (1½ inches steam pipe, 3 pieces totalling 25 feet) ..	34-1-0	
Handle for turning the borer ..	14-8-0	
Manila rope, ¾ inch to 60 feet length ..	15-0-0	
Gin block, 12 inches by 1½ inches ..	20-0-0	
Tripod ..	21-14-0	
Jumper (to loosen stiff soil or break up bricks) ..	43-8-0	
One-inch octagonal steel bar (2 feet by 10 feet) Sal-wood frame with 4 W. I. pegs ..	16-0-0	
Two spades with wooden handles ..	3-0-0	
Two buckets and a rope ..	5-8-0	
Hundred-foot measuring tape ..	7-0-0	
'Thela' for transporting boring apparatus ..	15-0-0	
TOTAL .. Rs.	235-7-0	

The borer is of special steel and was imported from America. The other articles were purchased in Lucknow or were available locally.

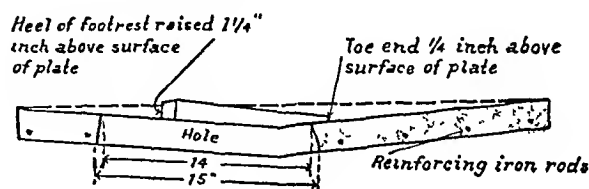
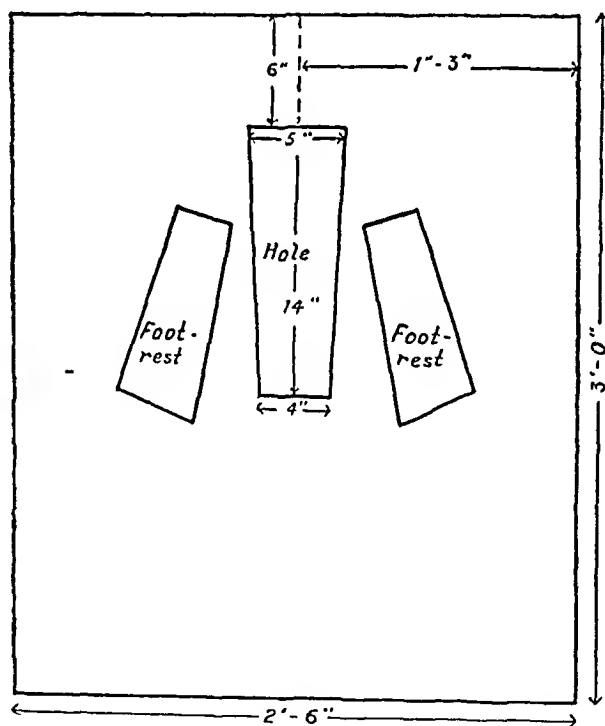
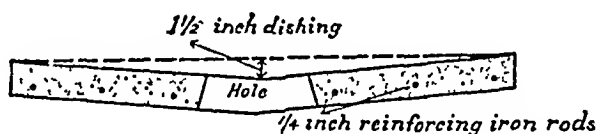
Personnel required

One mason overseer at Rs. 25 per mensem.
Five coolies at Rs. 8 per mensem.

Dimensions of holes

The holes were 16 inches in diameter and were bored to a depth of 20 feet. Seventeen holes with an average depth of 8.6 feet were abandoned due to 'kankar' or bricks. This number constitutes 5.1 per cent of the total number of holes attempted.

PLAN OF SQUATTING PLATE.



Number of holes

The number of holes bored successfully during a period of 9 months was 317. These holes were distributed as follows :—

In Bela municipality ..	111
In Katra Medniganj town area ..	25
In Partabgarh town area ..	63
In 21 villages ..	114

Thirty-four of the holes were bored in schools and the rest in private houses. No holes were bored to serve as public latrines.

Boring time

The time required to bore a hole in sandy soils was considerably less than that required for boring holes in hard clayey soils. The average boring time per hole worked out to be

five hours and three minutes. The average time to dismantle, transport and re-erect the tripod, and to carry tools and equipment from place to place was fifty minutes.

Casing

One hundred and eleven of the bored-hole latrines were constructed in sandy soil. The majority of these were made before the rains.



Boring a hole.



Latrines showing different kinds of superstructures.



Construction of squatting plates.

In none of these, however, has any collapsing of the walls been noticed so far.

As an experimental measure a easing of wire-gauze—a cylinder 12 feet high and 15 inches in diameter—was placed in one of the holes.

Seat

Almost all the latrines have been provided with seats of the squatting type. A squatting plate is placed directly over the hole.

Superstructure

Superstructures to afford privacy and protection from rain and sun are usually constructed by the people at their own cost. Bricks, thatch, mud and wood are the materials generally used for making the superstructures. Considering the comparatively short life—three to five years—of the bored-hole latrines it is not advisable to use costly material. The superstructures were so made as to rise directly from the edge of the cement plate. They thus enclose an area of 3 feet by 2.6 inches only, which proves quite sufficient. In the side walls there are ventilating holes just above the squatting plates as well as near the roof.

Construction of squatting plates

The squatting plates are made of reinforced cement concrete. The design recommended by a representative of the Rockefeller Foundation has proved very satisfactory. The plates are cast in a wooden mould. They are taken out after 24 hours, when foot-rests sloping forward are added. The face of the hole in the squatting plate is splayed outwards and downwards so that there is no soiling of the sides.

Dimensions

The squatting plates measure 3 feet by 2½ feet. They are dished 1½ inches from edges to centre and their thickness throughout is 2 inches. The hole is situated at a distance of 6 inches from the posterior edge and is 14 inches long. Its width is 5 inches in front and 6 inches behind; see illustration and drawing.

Requirements

	Price
Thatch shed for mason to work in, 20 feet by 14 feet	Rs 8-0-0
Galvanized iron sheet, plain, 3 feet by 8 feet to serve as a mixing platform for cement, sand and concrete	" 4-11-6
Two shovels	" 4-0-0
Two buckets and a rope	" 5-8-0
Four sets—teakwood frames (moulds)	" 48-0-0
Wooden stamper	" 0-8-0
Template (iron sheet)	" 3-6-0
Empty kerosene oil tin	" 0-6-0
Two 'taslas' of iron (basins)	" 1-8-0
TOTAL	Rs. 75-15-6

Materials required to make 40 squatting plates

Article	Amount	Price
Cement	8 sacs (12.5 cubic feet).	Rs. 23-0-0
Sand	16 sacs (25 cubic feet)	....
Concrete	32 sacs (50 cubic feet).	Rs. 3-8-0
Iron rods (½ inch diameter).	960 feet or 193 pounds (80 rods).	" 14-2-0
Oil for greasing the moulds.	5 pounds.	" 1-0-0
Solution of silicate of soda.	1 phial.	" 0-7-0
TOTAL		Rs. 42-1-0

Personnel required

One mason at Rs. 15 per mensem.
One coolie at Rs. 8 per mensem to assist the mason.
Two coolies at Rs. 8 each per mensem. They bring sand from the river, transport squatting plates and also reduce concrete to the proper size.

General remarks

Some of the latrines have been in use for about nine months. A bored-hole latrine which is properly looked after is free from offensive smell. Flies do not breed in it because of its depth. It provides a satisfactory and inexpensive method of disposal of human excreta (urine and solid matter). It is convenient, as it can be installed right in the house. It is cheap and requires very little space. One hole suffices for a family of 5 persons. Disinfectants or the services of a sweeper are not needed. The latrines are consequently growing popular.

Summary

Average cost of boring one hole	Re. 1-7-0
Average cost per hole of transporting and erecting boring apparatus	" 0-4-0
Average cost of squatting plate	" 1-10-3
Average cost of transporting squatting plates	" 0-9-0
Average total cost per hole	Rs. 3-14-3

A Mirror of Hospital Practice

TOXIC EFFECTS PRODUCED BY COMBINED TREATMENT WITH ATEBRIN AND PLASMOCHIN

By R. N. CHOPRA, C.I.E., M.A., M.D. (Cantab.)
LIEUTENANT-COLONEL, I.M.S.

and

A. K. M. ABDUL WAHED, M.B. (Cal.)

(From the Carmichael Hospital for Tropical Diseases, School of Tropical Medicine, Calcutta)

T. G. B., a young Anglo-Indian male, aged 25 years, contracted malignant malaria in 1927 and suffered from frequent relapses during the following two years in spite of repeated but insufficient administration of quinine. Combined use of quinine and esanophele relieved him a great deal and for the next two years except

for a few mild attacks he kept well. In October 1932 he had a severe attack of malaria lasting for 7 days and was treated with quino-plasmochin, three tablets daily for five days. During the following five months he took two tablets of quino-plasmochin a week as a prophylactic measure but in spite of this he had several slight attacks. Altogether he had taken about 55 tablets of quino-plasmochin.

The patient also had hookworm infection and suffered from low fever, loss of weight, loss of appetite, disinclination to work and mental depression. He was treated with chenopodium but his general condition did not improve.

Early in December 1933 he again got fever and was given one tablet each of atabrin and plasmochin three times a day for 5 days. As soon as he finished this course he had pain under the lower part of the sternum and in the epigastric region and had difficulty in breathing. He developed marked cyanosis of the lips and finger nails, and suffered from severe palpitation of the heart. These symptoms continued with intensity for 4 or 5 days and then gradually abated.

The patient was then admitted into the Carmichael Hospital for Tropical Diseases for investigation and treatment. Clinical examination did not reveal anything except that the finger nails and lips were still blue. The pulse rate was somewhat quick, but physical examination of the heart did not reveal anything abnormal. The blood showed eosinophilia amounting to 15 per cent, but nothing else abnormal could be detected. An electrocardiogram of the heart showed a slight increase in the P-R interval (0.14 seconds), potential of R wave in the second lead was increased (2.3 millivolts) and the heart rate was 94 per minute. The picture was that of an irritable condition of the myocardium. Nothing abnormal was found in the urine. A skiagram of the lungs showed extensive fibrosis and infiltration but von Pirquet's test was negative.

The interest of this case lies in the sudden development of toxic symptoms after the combined administration of atabrin and plasmochin in therapeutic doses. Quite a number of cases of poisoning by the combined use of these two antimalarial drugs have been recently reported in this country and it would appear that there is a distinct tendency for one drug to increase the toxicity of the other when given together; even fatal results are said to have occurred.

The cardiac symptoms in this case are also of interest. The patient suffered from severe palpitation and shortness of breath. Although he was not seen when these symptoms were at their height, the examination of the heart did not reveal any great damage to the myocardium. That the heart muscle was undoubtedly affected is shown by the fact that when examined a week later when the acute symptoms were subsiding, it still showed all the symptoms of markedly increased irritability.

CALCAREOUS DEGENERATION IN A UTERINE FIBROMA

By SATYAPRIYA MOZUMDAR, M.B. (Cal.)
F.R.C.S. (Eng.)

A MIDDLE-AGED woman about 45 was admitted with a tumour in the abdomen. The history was very vague, duration of symptoms being anything between 5 to 10 years with amenorrhoea for the same period. Evidently her periods

had stopped about the time she noticed the lump in her abdomen. She was fairly well nourished.

On vaginal examination before operation, a sound could not be passed into the uterus but this was put down to the tortuousness of the uterine cavity owing to irregular growth of the fibroid.

During operation, under percaïne (spinal) anaesthesia, the tumour was found fairly easy to remove as there were very few adhesions, considering the duration of the growth, and an ordinary supra-vaginal hysterectomy was performed. But while dividing the cervix, no oozing was discovered.

On trying to divide the tumour, after operation, it was found impossible to cut it with an ordinary knife deeper than the superficial half inch of tissue. Then an amputation knife was tried, with no better result. I had actually to use the chisel and hammer for nearly half an hour before I could cut the tumour across—it being practically completely calcareous with no uterine mucous membrane left, the whole uterus being involved in this degeneration. This explained the long period of amenorrhoea although the ovaries were healthy, and also the inability to pass the uterine sound and the absence of mucus exudation from the cut surface of cervix during operation. The tumour weighed about 6 lbs., although its size was only about 6 inches by 4 inches by 6 inches.

The patient made an uneventful recovery.

A CEREBRAL TYPE OF MALARIA LIGHT-ED UP BY A SUDDEN SHOCK

By CHINMOY LAHIRI, L.M.S.
D. B. Medical Officer, Rangpur

On the morning of the 15th October, I. M., a Mahommedan male, aged 13 years, had a fall and became unconscious.

I was called about 10 a.m. to see the patient and found him unconscious with irregular and violent muscular twitching, temperature 97.8°F., pulse irregular and feeble, respiration hurried, pupils slightly dilated but equal, sordes around the mouth, knee jerks present and other reflexes intact, and spleen enlarged about 2 inches below the costal margin.

There was no history of similar previous attacks, and the family history of syphilis was negative. The patient's father admitted that the boy had three or four attacks of malaria prior to this illness. So I suspected it might be a case of cerebral malaria set up by a sudden shock and at once injected grains 10 of quinine bihydrochloride intramuscularly. No other medicine was prescribed as the patient was unable to swallow. The patient had a rise of temperature to about 104°F. shortly after the injection. Another dose of grains 10 of quinine was injected the same evening at about 8 p.m. Next morning the general condition was slightly improved though the boy was still unconscious with muscular twitching persisting at long intervals. I gave him 0.1 gramme of atabrin dissolved in 10 c.c. of normal saline intravenously at about 9 a.m. About midnight the patient regained his senses and his temperature came down to normal. He was then put on a course of atabrin along with a simple alkaline mixture and made an uninterrupted recovery within a week.

I am thankful to Dr. S. K. Sirkar, District Health Officer, for kindly permitting me to publish this case note.

[Note.—Although there is strong presumptive evidence that this patient was suffering from malaria, it seems to us that the condition may only have been one of severe concussion. Further, the history does not make it clear that the fall was not due to the loss of consciousness.—Editor, I. M. G.]

Indian Medical Gazette

APRIL

THE TOTAL CINCHONA ALKALOIDS

THE employment of the total cinchona alkaloids in the treatment of malaria is so largely an economic question that whenever it is raised at a medical conference, someone invariably kills any discussion by pointing out that it has gone beyond the scope of such a conference. We have never been privileged to attend the deliberations of those responsible for the finances of either India or any of its provinces, but we have little doubt that when these are concerned with the policy of the country or province with regard to the cultivation of cinchona, and the provision of a cheap malaria treatment for the people, they are frequently hampered because these experts find themselves led into discussions that are primarily medical.

The consequence is that no particular policy is adopted, and that we muddle on year after year; India produces only a small fraction of the drugs she requires yearly for the treatment of her malaria-stricken population, and there seems no prospect in the near future of her being able to reduce the discrepancy between her production and her requirements, yet there are in this country large tracts of land suitable for the cultivation of cinchona bark, which if planted now would make India entirely independent of foreign quinine, or other antimalarials, within a very few years, and would provide a very considerable margin for export.

There is a never-failing supply of excuses for inaction in this matter, but one that has been used frequently during the last few years has been that the League of Nations' Health Organization is considering the matter.

The report of the League of Nations' Malaria Commission on this particular subject appeared last June in the *Quarterly Bulletin of the Health Organization*.

In our last issue we discussed this report and reprinted extracts from it. Further extracts will be found in our present issue; these include the opening paragraphs of the report in which the general aims of the commission are set forth. To those who have followed the cinchona-alkaloids controversy and have awaited this report of the commission with high hopes that an authoritative statement would be produced, these paragraphs provide almost tragic reading, in view of the nature of the rest of the report. One's hopes were raised to a high level because one felt that the problem, as it exists in India to-day, seemed to be so fully understood; no words could express India's needs better than do the following, which are quoted from this section of the report:—'The

aim of large-scale antimalarial effort by means of drugs is not concerned with providing a medicine which is the most effective antimalarial remedy known to medical science. What is aimed at is to provide a remedy that is so abundant and can be obtained so cheaply that it can be made readily available to the whole population of malarious countries. The endeavour of the Malaria Commission is to arrange a scheme of that kind. In such a plan there is no question of providing the most effective remedy known, nor even, necessarily, of providing a remedy as effective as quinine. The object is simply to provide, preferably by local cultivation of *C. succirubra*, or by other action in the malarious countries themselves, an abundant supply of a medicine, which will mitigate the severity of malarial attacks and prevent the disease from terminating fatally'.

Having thus shown that they understood what was the most urgent requirement of malaria-stricken nations, the commission then proceeded to devote almost the whole of the rest of the report to secondary matters. There is certainly reference, to the composition and standardization of totaquina (but this, though it was the work of the commission, is now old history), to certain experiments with the total alkaloids in bird malaria carried out by Professor Giemsa, to the results of treatment in five cases of induced malaria with each of the two varieties of totaquina, and to the difficulties of clinical investigation (in this connection they have drawn up certain rules to be observed for testing totaquina clinically); but otherwise they appear to have been lured away from their main purpose by the glitter of the new synthetic antimalarials. We should be the last to deny the extreme value of the work that was reported upon, as far as the treatment of the individual malarial patient was concerned, but it has left the problem that they set forth in the first paragraphs of the report exactly where it was before.

Many of our readers will be familiar with the total-cinchona-alkaloids problem, but, for those who are not, we will give a brief résumé of the main points. Cinchona bark contains a number of alkaloids; of these quinine is the one that has achieved most popularity in the treatment of malaria and is therefore most in demand. This has led to the cultivation of the particular species of cinchona tree that will produce bark giving the highest yield of quinine, but it is not a hardy species and it will only grow in certain areas; in India these areas are very limited. Nevertheless, while the main demand is for quinine only, it is not an economically sound policy to grow, even in India, any but *Cinchona ledgeriana* with its high quinine yield. However, it has been shown that the other alkaloids of cinchona bark also have antimalarial properties; it has been claimed by some workers that with certain species of plasmodium the action is even

greater, and it is generally acknowledged that the action on any species is only slightly less, than that of quinine. If therefore all the alkaloids of cinchona were utilized in the treatment of malaria, the amount of antimalarial drug that could be extracted from each pound of cinchona bark would be much greater and, further, it would become unnecessary to use only the special tree giving a high quinine yield, and harder species, such as *Cinchona succirubra*, which give a high yield of the total alkaloids, could be planted extensively. Not only is this mixture of the alkaloids of cinchona bark cheaper than the pure alkaloid quinine, but, if it were in demand, it could, after the few years which would be necessary for the extension of the plantations, be produced in almost limitless quantities in this country. Exactly why it is not in demand, it is difficult to say, but there is no doubt that 'cinchona febrifuge', a generic name applied to all mixtures of the cinchona alkaloids, has never achieved any real popularity though in certain provinces in India it has been, and is still, used extensively. One reason undoubtedly is that from time to time various mixtures of the residue from quinine manufacture have been placed on the market and labelled 'cinchona febrifuge'; these mixtures contain very little quinine, and an abundance of the amorphous alkaloids which are not only practically inactive but tend to make the tablets of cinchona febrifuge hard and insoluble.

The introduction of this new standard mixture of the cinchona alkaloids, totaquina, is a very definite step in the right direction. It will not be an exact mixture of the alkaloids but one whose composition varies within certain limits: these limits are sufficiently rigid to allow the clinician to advocate a standard dosage from which he may expect a response that will vary only within the usual range of clinical experience with quinine, and at the same time will not be so rigid as to complicate manufacture or to prevent the mixture from being made directly from the hardy *C. succirubra* or *C. robusta*, without the addition of alkaloids from another source.

These observations refer to totaquina (type I). We cannot, however, see why the commission found it necessary to complicate matters by introducing a second type; the only useful function totaquina (type II) appears to perform is to provide the quinine manufacturer with a means of disposing of his residue. The few tests that have been made suggest that this type II displays a very low degree of efficacy, and we think it is a pity that the name 'totaquina' should have to bear the stigmata that it will acquire if the quinine manufacturers are allowed to place this poor-quality antimalarial on the market under this name.

In view of the fact that the areas where *C. ledgeriana* grows well are limited and that these areas are mostly in Java, the Dutch

planters exercise a complete control over the quinine market of the world. At present there is a glut on the quinine market, but, by virtue of this control, the high price has been maintained. When we say 'glut' we do not mean that there is more quinine made than is required, but more than malaria-stricken nations can afford to pay for; India cannot afford to buy more than about one-tenth her real requirements. We may therefore assume that foreign cinchona planters and quinine manufacturers will be definitely ranged against the suggestion for the widespread use of totaquina, but those in control of the plantations and factories in this country, which are all government-owned, are both willing and anxious to co-operate if they can get a clear lead from the medical profession; this would be indicated by an increasing demand for totaquina.

The uncertainty regarding the composition of the cinchona-alkaloid mixtures, which has been the excuse used by medical men in this country for adhering doggedly to quinine, now no longer holds good if totaquina (type I) is prescribed, and one hopes that when this product is generally available we shall see an increase in the demand for the total alkaloids of cinchona.

Outside medical circles there is a distinct feeling that the substitution of 'cinchona febrifuge' for quinine in provincial dispensaries is an attempt to foist an inferior article on to the poor. For this entirely wrong interpretation, the medical profession must bear some of the responsibility, as public opinion in such a matter is naturally influenced by medical opinion.

Trials that have been conducted with total-alkaloid mixtures at Kasauli and elsewhere in this country have shown that for practical purposes they are equal to mixtures containing the single alkaloid quinine. The League of Nations' Malaria Commission have confirmed this in the following words:—'It appears from these results that totaquina type I (total alkaloids of *C. succirubra* or *C. robusta*), when used in ordinary clinical therapeutic doses for curative purposes—e.g., 1.2 gm. (20 grains) daily for five to seven days—should give about the same good result as is given by quinine in the same doses. If this is so, and if this type of totaquina can be obtained more cheaply than quinine, it would be advantageous to use it for general purposes instead of the single alkaloid.

However, in view of the extreme paucity of the trials that were conducted under their auspices and of the lack of prominence given to this conclusion, it cannot carry much weight, and we feel that a wonderful opportunity of placing this question of the efficacy of the total-alkaloid mixtures beyond any possible doubt, and of making a really authoritative pronouncement on the subject has been missed.

If a commission of the League of Nations, whose expressed purpose was to investigate this problem and who fully understood the position in India to-day, failed to produce an

authoritative answer; one almost despairs of this ever being given; yet until it is given we can expect no progress in the matter of the cinchona policy in this country.

Medical News

REPORT OF THE THIRD CONFERENCE OF THE ALL-INDIA OPHTHALMOLOGICAL SOCIETY

THE Third Conference of the All-India Ophthalmological Society was held in the auditorium of the All-India Institute of Hygiene and Public Health, Calcutta, from the 19th to the 21st December, 1933. The attendance was the largest on record and was well supported by large numbers of delegates from all parts of India. Dr. A. Fuchs from Vienna and a number of other visitors attended the Conference.

The Conference was formally opened by Sir Hassan Suhrawardy, M.A., F.R.C.S., Vice-Chancellor of Calcutta University, in an excellent speech in which he pointed out the absence of facilities for ophthalmological work in India and regretted that this vast country was still very backward in the number of well-equipped and modern ophthalmic hospitals. The enormous ophthalmic centres in the capitals of the various provinces of India were maintained at Government expense, and, in each, magnificent work has been and is being done, but he hoped that wealthy Indian gentlemen would come forward with sufficient money for the establishment of further ophthalmic hospitals and schools where efficient post-graduate training and research could be carried out.

In welcoming the delegates, Dr. D. N. Maitra, chairman of the Reception Committee, said that the problems of health which included that of the eye were at the bottom of social education and economic problems.

Lieut.-Col. J. N. Duggan (Bombay) was formally proposed to be president of the Third Conference by Lieut.-Col. E. O'G. Kirwan (Calcutta) and seconded by Dr. G. Zachariah (Madras).

Lieut.-Col. Duggan, after acknowledging the honour paid to him in being elected to the office of president, gave in his address a comprehensive survey of the progress which ophthalmological science has made in recent years, and stressed the need for a well-organized and systematic campaign for the prevention of blindness in India as much of the blindness is preventable and yet there are enormous numbers of blind and partially-blind people all over the country. He pointed out that India had earned a place in ophthalmology in the past. The intracapsular method of cataract extraction and sclero-corneal trephining for the relief of glaucoma have been two notable contributions to operative surgery. He acknowledged the work done in the clinical, pathological and operative lines by distinguished members of the Indian Medical Service who had gone far to raise the status of Indian ophthalmology, and pleaded that this work must be continued hereafter if the prestige of Indian ophthalmology is to go still higher. In concluding he reiterated that, as there is such an abundance of clinical material available in all parts of India, research should be encouraged on thoroughly scientific lines.

In the afternoon the scientific session was opened by a paper on epidemic superficial punctate keratitis in Bengal by Lieut.-Col. E. O'G. Kirwan. After describing in detail the clinical findings, pathology and treatment, he pointed out that the name superficial punctate keratitis was a misnomer as in a large number of these cases the affection produced a mild iridocyclitis. He therefore favoured the suggestion of Lieut.-Col. R. E. Wright that it should be called keratitis

diversiformis et uveitis anterior. The paper was illustrated by slit lamp paintings.

An interesting paper on the treatment of spring catarrh by injections of foreign proteose emulsion from the urine by Dr. Banaji (Bombay), produced a lively discussion in which a large number of members took part.

Dr. Fuchs (Vienna) read a paper on the surgical treatment of iritis.

This was followed by a paper on Parinaud's conjunctivitis by Dr. Sanyal (Calcutta) which was illustrated by lantern slides. The afternoon session closed with a paper by Dr. Bhaduri (Calcutta) on observations on the leprotic affections of the eye in which he pointed out the causes of the wide variation of the ocular incidence in leprosy and advocated the benefit of iridectomy in the early stages of iritis.

In the evening a magic-lantern-slide and cinema demonstration was given by Lieut.-Col. E. O'G. Kirwan, on prevention of blindness and care of the eyes in India.

The second scientific session was held on the morning of the 20th December, 1933, and among the most interesting papers was one by Dr. S. K. Mukerjee (Calcutta) on further observations in glaucoma as a result of epidemic dropsy, which comprised tonometric, ophthalmoscopic and visual field studies.

The president of the Conference, Lieut.-Col. Duggan, read a very instructive paper on the treatment of external eye diseases with ultra-violet light.

Dr. J. Gnanadikam's paper on iridencleisis was most instructive and in it he pointed out the advantages of this operation over other methods of decompression from his experiences of a large number of cases. It was clearly evident, from the discussion that followed, that the operation of iridencleisis has many advocates in India, although most ophthalmologists favour sclero-corneal trephining in chronic primary glaucoma in the majority of cases.

An interesting paper which stirred up a hornet's nest was one by Dr. S. N. Shroff on the intracapsular cataract operation suitable to the conditions in India in which he stated from his personal experience that the expression operation of Lieut.-Col. Smith with certain modifications is the most suitable to the conditions in India where there is such a large amount of work to be done in a limited time. He pointed out that in all cases the lens should be tumbled but in cases in which there was a strong zonule capsulotomy should be done.

The Madras school of ophthalmology produced a most interesting paper by Lieut.-Col. R. E. Wright and his staff on von Hippel-Landau's disease. There were only three cases seen out of more than a quarter of a million fundus cases examined in Madras. Two of the cases were followed up for a long period; in all cases the changes observed were only in the retinal vessels on one side and there was no evidence of a familial nature, nor of the central nervous system or any skin affections.

The third scientific session took place on the afternoon of the 20th December, 1933, and among the most interesting papers read was one by Dr. Bhaduri (Calcutta) on some observations on hypotension in cholera in which he showed tonometric records in 46 cases, and that the blood specific gravity varies inversely with the intraocular tension. Capt. K. Sen

(Calcutta) read a paper on the asepsis of the conjunctival sac in intraocular operations, in which he stated that 64 per cent of the conjunctival sacs before intraocular operations showed no growth in 48 hours culture, and of the remaining 36 per cent, one-half showed harmless organisms and the remainder streptococci, staphylococci, etc. He advises the use of mercuriochrome drops one per cent, irrigation of the conjunctival sac with 1 in 10,000 oxycyanide of mercury and, immediately before operation, irrigation of the sac with normal saline. A lively discussion followed in which many members took part.

Perhaps the most interesting paper in this session was read by Capt. S. C. Dutt (Calcutta) on the development of modern ophthalmology in Bengal in which he surveyed the period extending from the time of the Honourable East India Company in 1796 to the present day.

The fourth scientific session took place on the morning of the 21st December and among the most interesting papers was one by Lieut.-Col. E. O'G. Kirwan on blue sclerotics in which he pointed out the paucity of cases in this vast country. He illustrated two cases with coloured sketches and discussed the different views on the causation.

Dr. Rafatullah's paper on Webster's operation for entropion produced a keen discussion and the author advocated his mucous graft operation as a foolproof method in the cure of this common and troublesome complaint.

Dr. H. K. Indra (Calcutta) read three short papers on lenticulus posterior, Kruekenberg's spindle and a case of aphakia with apparent accommodation. All these papers were beautifully illustrated with slit lamp paintings carried out at the Eye Infirmary, Medical College, Calcutta.

The fifth scientific session took place on the afternoon of the 21st December, 1933, and amongst the outstanding papers of interest were Dr. Biswas' (Calcutta) notes on a few cases of epidermoid carcinoma, a paper by Capt. N. N. Roy (Calcutta) on septic thrombosis of the cavernous sinus and orbital cellulitis, the after treatment of cataract by Dr. N. Chatterjee (Calcutta) which produced a lively discussion in which many members took part. Dr. J. N. Banerjee (Calcutta) read a comprehensive paper on school myopia in Bengal.

The annual general meeting of the All-India Ophthalmological Society took place on the evening of the 21st December at which a resolution advising more thorough legislation on the proper examination of the

eyesight of drivers of motor vehicles was moved by Dr. Narayan Rao and carried unanimously. It was also resolved to draw the attention of some of the universities in India to the absence of a special paper in ophthalmology in the final examination in medicine.

The following office-bearers were elected:

President	Lieut.-Col. J. N. Duggan, C.I.E.
Vice-Presidents	Lieut.-Col. R. E. Wright, C.I.E., I.M.S. Lieut.-Col. E. O'G. Kirwan, I.M.S.
Secretaries	Dr. G. Zachariah, D.O.M.S. Dr. B. N. Bhaduri.
Treasurers	Dr. S. N. Shroff, D.O.M.S. Dr. K. N. Karanjia, F.R.C.S.

It was decided that the next meeting of the All-India Ophthalmological Society should take place during the Easter week of 1935 in Madras, and the subject for discussion should be nutritional disorders of the eye.

The congress was finally brought to a close on the night of the 21st December when it ended with a dinner at the Great Eastern Hotel at which many delegates and members were present, and the general impression was that the congress was a great success, and had led to much mutual understanding and co-ordination not only in the working out of scientific problems, but in bringing together workers from various parts of India.

LONDON SCHOOL OF HYGIENE AND TROPICAL MEDICINE

HIS ROYAL HIGHNESS THE PRINCE OF WALES has graciously consented to become patron of the London School of Hygiene and Tropical Medicine, with which is incorporated the Ross Institute. This gratifying announcement was made at the staff and students' dinner by Sir Austen Chamberlain, the chairman of the Court of Governors.

NOTICE

From time to time we receive requests from book-sellers, particularly in Europe and America, for back volumes of the *Gazette*.

We have recently received such an enquiry for volumes 1 to 47. Readers who have any early volumes for sale are invited to forward details to us.—Editor, I.M.G.

Current Topics

A Review of Published Results obtained with Atebrin in the Treatment of Malaria in Malaya (Part VI. Summary and Conclusions)

By A. L. HOOPS, C.B.E., M.D., D.P.H.

(From the *Malayan Medical Journal*, December 1933, Vol. VIII, p. 232)

DUNCAN, BARROWMAN and HOOPS have reported on the treatment of 2,219 members of labour forces, including dependents, with atebrin alone or with atebrin and plasmoquine.

Adequate oiling was maintained on most of the areas inhabited by the labour forces. All original cases treated for further attacks of malaria were reckoned as relapses. Nearly two-thirds of those treated, 1,418 cases, were kept under observation, by Duncan and Barrowman for over 6 months, by Hoops from 3 to 15 months.

Although not diagnosed microscopically as malaria the relapse rates in unclassified cases quoted by Hoops are given because there will always be some estates without microscopes, and also odd cases of clinical malaria will occur in which the parasite is not easily demonstrable. These rates were 10 per cent amongst 60 persons treated with atebrin only and 7.4 per cent amongst 54 persons treated with plasmoquine and atebrin. Barrowman shows the same relapse rate, 5 per cent, in his subtertian cases treated with atebrin only and with atebrin plus plasmoquine. Second relapses were very rare in both benign tertian and subtertian types. From the results obtained the treatment of malaria with atebrin should be the method of choice in Malaya. Whether it is to be followed by a course of plasmoquine or not is really a public health problem depending principally on the effectiveness of the oiling in the area where the person treated is living. Atebrin treatment by the eradication of the schizonts prevents the formation of the later generations of gametes. The earlier broods of gametes will die out in a few weeks.

Whether plasmoquine should be given to kill the latter, depends therefore on the risk of infection being conveyed to others in any particular estate. In this several factors are involved—the number of persons with gametocytes in their blood; the number of malarial-carrying anophelines present (most important); the number of bites received from infected mosquitoes; the intensity of the infection conveyed. A change in the level of the surface water, an influx of unhealthy new labourers or the felling of a new area may necessitate the adoption of measures not previously needed.

The Malarial Commission's report (pp. 236-237) suggests that the percentage of malarial cases containing gametocytes in their blood may at times be as low as 1 per cent though in children it may be 17 per cent or more. But Green, in a series of 1,000 subtertian cases, found that over half carried crescents in the proportion of one or more per 200 leucocytes and were therefore potentially infective to *A. maculatus* (*Bulletin I. M. R.*, No. 5 of 1929). If these high rates are common in Malaya the argument for giving plasmoquine is strengthened.

Green found also that gametocytes seldom appeared before the 6th day in new infections and took on an average nearly 8 days to disappear under treatment with plasmoquine compound—the limits being 4 to 13 days (*Bulletin I. M. R.*, No. 3 of 1929). It may be assumed therefore that the treatment with plasmoquine simplex now in vogue should not be started before the 7th day in primary attacks, and that with an adult a dosage of between 0.03 gram and 0.02 gram daily should be continued for 7 or 8 days.

Remarks on quinine treatment

The condemnation of long courses and large doses of quinine by the League's Malaria Commission is welcome. The poisonous effects and the deterioration in efficiency caused thereby are well known.

The practice of clinical prophylaxis with daily quinine, mentioned in this report for use in countries where it is not considered practicable to use a proper system for the prevention of relapses, has no place in Malaya. Here the dark ages, when many Europeans took quinine daily during residence and for several months after returning home, are gone for ever.

Generally speaking under any system of quinine administration relapse rates of 50 per cent have been regarded as common, and of 33 per cent as satisfactory. Reference is invited to the various experiences of Duncan and Barrowman. With a short course of 10 days quinine—comparable to the 5 to 7 days course advocated in the League's report—without after treatment—Barrowman's relapse rates amongst 412 subtertian and benign tertian cases averaged 90 per cent. Though long courses are objectionable it is impossible to rely on such a short course for use among labour forces, for widespread infection would result.

I would suggest to those medical men who still prefer to use quinine instead of atebirin the trial of a 7 days course in hospital of from 20 to 30 grains of quinine bihydrochloride daily, followed, after intervals of two weeks each, by two or three supplementary courses of ten grains daily for a week, given in the lines. This would doubtless help to reduce the very high relapse rate met with by Barrowman, especially if a course of plasmoquine were given also. But low relapse rates cannot be expected with quinine.

Following the League Commission's comparison between the relative costs with quinine and with atebirin of a 5 to 7 days course for the clinical cure of a primary attack of malaria, the Amsterdam Bureau for Increasing the Use of Quinine claims, in a propaganda pamphlet, that to use quinine rather than atebirin for the cure of malaria is several times cheaper. But a comparison of immediate costs takes no account of the real effectiveness of each treatment, of the relative proportion of relapse rates, and of the resulting final costs for further treatment both of the original case and new infections, or of the resulting dislocation of work and loss of efficiency amongst labour forces.

Referring to the cost of the primary course of treatment only, Kingsbury states (1932 report of the F. M. S. Malaria Advisory Board):

'The present cost of quinine sulphate is \$16.50 (Straits) per lb. A bottle of 300 atebirin tablets costs about \$1 more. A pound of quinine sulphate was sufficient for treating 36 cases for a period of 7 days. The bottle of 300 atebirin tablets was sufficient to treat 14 cases for 7 days. The 7 day course of treatment with quinine sulphate costs about 45 cents while a 7 day course of treatment with atebirin costs \$1.23. If, on the other hand, a large quantity of atebirin tablets, say 10,000, were purchased, the cost of treating a case with atebirin for seven days was then 61 cents, as compared with 45 cents for quinine-treated cases'.

In this country during the gradual development of natural immunity to malaria many persons die: many of the survivors get enlarged fibrotic spleens, chronic nephritis, general debility, low haemoglobin, and become more prone to contract heavy ankylostome infections, bowel diseases and tuberculosis. They also spread infection to others. The avoidance of such risks by a short treatment with atebirin is true economy.

Conclusions

1. Atebrin is the best drug available for the treatment of all types of malaria in Malaya.

2. Though users of atebirin differ on this point it is not in my opinion advisable or beneficial to give quinine as a routine before commencing atebirin treatment.

3. Atebrin is as efficacious as quinine in abating the clinical symptoms of the primary attack of malaria.

4. Atebrin is infinitely superior to quinine in the prevention of relapses: judging by present records it may be expected to effect a radical cure in nearly 90 per cent of benign tertian and 95 per cent subtertian cases. If the relapse rates with it were twice as high it would still be the drug of choice.

5. For this reason it is a cheaper drug to use than quinine. Ross wrote 'The question of what are cheap and what are expensive measures is a comparative one and depends principally on what is the cost of the disease'. Barrowman's figures show conclusively that the cheapest method of combating malaria is to oil the danger zones and treat the cases with atebirin.

6. Relatively larger doses of atebirin are needed to cure children than adults: these doses are well borne.

7. In serious cases of malaria the injection of atebirin is probably as effective as the injection of quinine bihydrochloride.

8. Toxicity—the toxicity of atebirin is low. The same amount of supervision is necessary as should be given when quinine is used.

9. The ambulatory treatment of malaria should be discouraged. Cases do better in hospital and there is less risk of infecting others.

10. Plasmoquine if used should preferably not be administered until after the atebirin course is finished.

11. Further observations are needed as to the results obtained (a) with atebirin only and (b) with atebirin followed by plasmoquine.

12. Routine treatment of persons with enlarged spleen. It appears that routine dosing of all such persons with either quinine, plasmoquine or atebirin is wasteful and unnecessary. It is suggested that the blood and temperature should be taken and treatment given only if there is a positive indication.

13. Oiling. The practice of oiling should be continued even if labour forces are treated with atebirin. It is a question for the future whether the sterilization of the blood of labour forces with this drug, combined with research into the seasonal prevalence of malaria-carrying mosquitoes, may enable oiling to be restricted in some places during certain months.

Neurological Emergencies

By WILFRED HARRIS, M.D. (Camb.)
R.N.C.P. (Lond.)

(Abstracted from the *Lancet*, October 14, 1933, p. 840)

FITS

Fits of various kinds, or coma, due to many different causes, are a common cause of difficulty, and a correct diagnosis will often mean the saving of a life.

You receive an urgent call, and find a middle-aged man, or woman, lying quite unconscious, perhaps at the foot of a staircase. If you know the patient is the subject of epileptic fits, your diagnosis may be easy, but you have to consider even then whether the patient fell in a fit before going upstairs, or whether a severe fall downstairs has caused a fractured skull, or whether it is a case of primary cerebral hæmorrhage. Evidence of bleeding from scalp or ear, or bruising, will indicate a fall, and further evidence of unequal pupils, conjugate deviation of the eyes, twitching of face or limbs, or signs of hemiplegia, may clinch the diagnosis of cerebral injury. The position of the patient relative to the surroundings should be noted before his removal to a couch or bed. What next is to be done? All clothing should at once be loosened, and then removed, and the patient put to bed with hot bottles, well wrapped in a blanket, to the feet. Never forget the danger of a hot-water bottle burn in these conditions. The odour of the breath may give a clue, an alcoholic smell suggesting possible drunkenness as the sole or contributory cause of the coma, but you must remember that a single glass of beer or cider taken two or three hours previously may be sufficient to taint the breath heavily. This is particularly important for police surgeons to remember in dealing with patients accused of being under the effects of alcohol to a degree rendering them incapable of being in charge of a car.

A highly nervous man too in such circumstances may stammer, and also sway in walking when under examination at the police station, or, a more difficult trap for the unwary, he may be the subject of slight ataxy from various causes, such as early tabes or combined sclerosis, cerebellar ataxy, or even aural vertigo.

The presence of definite nystagmus, especially if in one direction only, will indicate a lesion of the cerebellar system, but beware of diagnosing nystagmus from slight quick irregular movements of the eyes at the commencement of lateral deviation, especially in a nervous individual. Remember, too, that spontaneous nystagmus in all positions may be of congenital origin, such as albinism.

Conjugate deviation of the eyes may be either irritative or paralytic in origin. It is a common teaching that the eyes are turned towards the lesion in the brain in apoplexy, that is to say, that there is paralysis of the conjugate movement towards the opposite side, with unopposed action of the similar movement away from the sound side towards the side of the lesion. Deviation of the eyes may, however, be irritative from the lesion, and slight rigidity or even convulsions may be seen on the side that will be ultimately paralysed, and in this case the conjugate deviation of the eyes will be towards the sound side of the brain and away from the lesion, during the stage of cerebral irritation, ultimately swinging back towards the side of the brain lesion. Thus, in the early stages it is quite possible to diagnose the lesion on the wrong side of the brain.

The pupil reactions to light are a frequent source of error. Often they are said not to react when they are really normal, the test being carried out in a moderate or brightly lit room, with insufficient precautions. Beware of the small pocket torch as a test. Either a strong torch or electric light, or a bright

window light should be used, both eyes being properly shielded for a few seconds before testing. Repeat the test, exposing each eye separately. Very small pupils will suggest opium poisoning, pontine hæmorrhage, or the Argyll Robertson pupils of tabes. Unequal pupils will suggest a gross cerebral lesion, such as cerebral contusion or hæmorrhage, but the Argyll Robertson pupils of tabes or G.P.I. are often unequal.

To return to our unconscious patient, now in bed. An x-ray of the skull is important if the possibility of fracture has to be considered. This can be very efficiently done at the patient's house nowadays by portable apparatus of a special outfit driven by the car engine.

Depressed fracture, either in children or adults, is most important to recognize, though it may not be palpable as such, possibly only a lump being felt. The signs of cerebral injury, however, an irregular or slow pulse, slow or Cheyne-Stokes' breathing, unequal pupils, or squint, should indicate a graver type of cerebral injury than mere concussion, and pointing to either severe contusion, laceration, or compression from fracture or hæmorrhage. If, then, there is a definite lump or gross irregularity of the skull, it will be advisable not to wait for an x-ray, but to proceed at once to shave and sterilize the area of scalp concerned, and to cut down upon the bone to make certain of its condition, when a depression may be often quickly dealt with and a life perhaps saved.

Concussion may be followed by recovery of consciousness, and later may be followed by delirium, increasing drowsiness, and coma. This condition indicates the onset of cerebral oedema as a sequel of contusion of the brain and of numerous minute hæmorrhages, possibly even laceration of the brain in more severe injuries. Lumbar puncture will almost certainly show yellow staining from altered blood, or even the cerebrospinal fluid may be mixed with fresh blood, the pressure of the fluid being high and registering 200-300 on the manometer. This is a very important stage to recognize, as the patient will almost surely die if left alone. A decompression operation must be done at once, a large bone flap being raised, so as to allow of expansion of the oedematous brain. There may be no localizing sign or indication on which side to operate, in which case a right subtemporal decompression should be done. In a few cases the cause of the cerebral compression will be found to be an extradural hæmorrhage from a torn middle meningeal artery, but then there is almost always some local indication on which side to operate.

Lumbar puncture, too, may settle the question of cerebral hæmorrhage, the fluid being intimately mixed with blood. The inexperienced may in such a case mistake the mixed blood and fluid for blood from a punctured vein, and be unaware that his needle has correctly pierced the spinal theca. More accurate information can be obtained by using a special spinal needle with manometer attached to read the pressure. If the fluid rushes up the tube past the normal 140 or 150 mm. mark to 250 or more, then severe intracranial pressure is evident. Beware then of withdrawing more than the minimum of blood-stained fluid, as fall of pressure might start fresh cerebral hæmorrhage.

Examination of the optic discs should be done as soon as convenient, as clues to the condition may be found in retinal hæmorrhages, large or small, albuminuric retinitis, or the choked discs of cerebral tumour. In the latter condition immediate benefit may result from dehydration by intravenous injection of 3 oz. of 15 per cent salt solution, or, if that method is not possible, the rectal injection of 8 oz. of a 25 per cent solution of magnesium sulphate.

COMA

The causes of coma are too numerous for us to examine them all. In epileptic coma the patient lies flaccid with dilated pupils and stertorous breathing,

somewhat livid in colour, no conjunctival reflex, the tongue possibly bitten, with blood around the lips, and evidence of relaxed sphincters. After two or three minutes in this state he may quickly recover, or may go off into a heavy sleep for three or four hours.

Narcolepsy.—Deep sleep resembling coma may be due to narcolepsy, a curious condition in which an uncontrollable desire to sleep recurs at irregular intervals. Subjects of this disease also are liable to sudden falls, without loss of consciousness, cataplectic attacks, which must be distinguished from petit mal. These attacks are brought on especially by the emotion of laughter, the legs giving way suddenly. Indeed, they remind us of the well-known saying of being 'helpless from laughing'. Bromide and luminal are of no use in this disease, but ephedrin may be tried. Similar overpowering sleep may be met with in acromegaly, and in other lesions near the pituitary infundibulum and floor of the third ventricle, an area of the brain which is especially associated with the phenomena of sleep. This association is also seen in encephalitis lethargica, in which the vascular lesions are particularly prone to affect this neighbourhood.

Coma may, of course, be due to many other poisons than alcohol. Nowadays the barbiturates, such as medinal or veronal, and luminal, are commonly taken in attempted suicide. Opium and morphine poisoning are less common since the Dangerous Drugs Act, except in medical men. If no signs of corrosion around the mouth and lips are evident, in the absence of signs of cerebral injury or hæmorrhage, or causes already discussed, washing out the stomach should be resorted to as soon as possible, using weak permanganate solution, if obtainable. Strong coffee should then be inserted through the tube, and hypodermic injections of ether, coramine, and camphor in oil.

The breath of a comatose patient may suggest alcoholism, or the heavy urinous odour of uræmia, or the sweetish odour of acetonaemia in diabetic coma. For uræmia, rectal injection of 25 per cent magnesium sulphate solution, and venesection of 15 oz. should be done, followed by the slow injection of half a pint of normal saline, followed by a smart purge.

In diabetic coma the immediate hypodermic injection of 30 units of insulin may restore consciousness, when a piece of cane sugar should be given, and blood-sugar estimations made. It must not be forgotten that coma may ensue in a diabetic patient due to hypoglycæmia, from excessive insulin dosage, especially if this is given shortly before heavy exertion, such as a game of cricket or football. This condition is usually preceded by irregular twitchings of the limbs. The blood-sugar is then much below normal, and the immediate intravenous injection of 20 c.c.m. of 30 per cent glucose solution should be administered, or, failing that, rectal injection of 4 oz. of 30 per cent glucose.

Hypoglycæmia may even occur without insulin treatment in cases of pancreatic tumour involving the Islands of Langerhans. These have been successfully removed by operation.

HEADACHE

Headache is one of the commonest symptoms calling for treatment, and its various causes are almost infinite in number. Yet, before administering aspirin, phenacetin, bromide, antikamnia, phenazone, or any of this range of painkillers, some rough attempt should be made to locate the cause. If it is one of a long series of headaches that have recurred at intervals for years, it is probably a case of migraine, especially if the headache is preceded by visual spectra of the well-known scintillating scotoma or fortification type, or the visual interference may be the sudden onset of hemianopia which will last perhaps 20 minutes. I have known the case of a hospital nurse who, when first attacked with this visual disturbance went to look at herself in a mirror, and being able to see only one half of her face became so frightened that she went off into hysterical convulsions. No headache

is present in this prodromal stage, but after an hour or so it may rapidly become violent and almost unbearable. An injection of 10 minims of 1 in 1000 adrenaline solution is sometimes very efficacious, but the ordinary headache remedies taken by the mouth are often useless, more particularly if vomiting starts early, as no remedy taken by the mouth can be retained. A hypodermic injection of grs. 3 of sodium luminal may then be given if the adrenaline has failed. In those cases in which vomiting does not start early, a cachet of grs. 7 of pyramidon with grs. 3 of cannabin tannate, grs. 1½ of sodium luminal and gr. ½th heroin is a useful combination to control the severity of the pain, sometimes aborting it within an hour in cases which otherwise are likely to continue for 12 hours or more. A heaped teaspoonful of effervescent litmopyrin (Bishop's) in a small wine-glassful of water taken immediately after the cachet is a useful addition.

Recurrent violent unilateral headaches may be due to other causes than migraine. One of the commonest and most important to recognize is sinus infection of the frontal sinus or of the antrum. Pain starting over the eyebrow about 10 or 11 a.m. and lasting until the late afternoon, day after day, is very suggestive of this cause, and the pain, especially in frontal sinusitis, may be so violent as to be almost unbearable. A small pledget of cotton-wool soaked in 20 per cent cocaine solution should be gently inserted and pressed against the lateral wall of the upper nasal cavity. This may arrest the pain almost like magic, and it acts by constricting the turgid mucous membrane and allowing drainage to take place from the sinus into the nose, thus relieving pressure. Do not forget the serious danger of a chloroform anæsthetic soon after using cocaine, as many deaths have been thus caused. Transillumination of the sinuses with a small but strong electric light in a darkened room will usually demonstrate a marked difference between a normal and an infected sinus or antrum, and the technique is so simple that every one of us should be familiar with it, and it should be used in every case of constant or recurrent headaches. X-ray pictures of the sinuses should also be taken when in doubt, and transillumination cannot reach the ethmoidal and sphenoidal sinuses.

Another form of recurrent unilateral violent pain in the eye and eyebrow is not associated with sinus infection, but may be a form of migrainous neuralgia. When limited to the region of the eyeball, I speak of it as *ciliary neuralgia*. The violence of the pain may be so intense as almost to drive sufferers to suicide, the pain lasting for one to two days, and recurring every few days for a period of weeks, and then perhaps disappearing for several months. Nasal douching with cocaine solution should be tried, as already described, and I have had several cases which have been completely cured by alcohol injection of the Gasserian ganglion. This type of neuralgia is quite different from that of the paroxysmal tic of *trigeminal neuralgia*. In the latter the paroxysms of pain last only for half a minute or so, but may recur every two or three minutes. I saw one such case a few weeks ago in August who had been sent home to me from Burma, who had had such violent shocks of facial pain on the right side every two minutes with very little sleep, since the beginning of June. Alcohol injection of the Gasserian ganglion arrested the pain instantly, but I cannot recommend this treatment to you for your own use in practice, as it is a very delicate method and requires long training to acquire the necessary dexterity.

Headache is likely to be a prominent symptom in the early stage of *meningitis*. There is probably some fever, and possibly delirium, and at first you may be doubtful of early typhoid. In the latter the abdominal reflexes are often absent and the typical rash may be seen, but do not be put off the diagnosis because the Widal serum reaction is negative during the first eight days. The spleen, too, may be palpable

and there is no head retraction, no rigidity of the neck muscles, nor Kernig's sign, as are likely in meningitis. The pupils in the latter may be conclusive, sluggish, perhaps unequal, and dilated, with an irregular pulse and vomiting. Lumbar puncture should be done, and the pressure noted on the manometer, if you have the necessary apparatus. The pressure is likely to be raised far above the usual 140 mm. Note if the fluid is clear or turbid. If clear, it may be a case of tuberculous meningitis, and examination of the fluid by a pathologist may demonstrate tubercle bacilli in the spider-web clot after standing, and the fluid is likely to contain diminished chlorides and a large excess of lymphocytes. Somewhat similar symptoms may occur in serous meningitis, but tubercle bacilli and lymphocytes are then absent and rapid cure is likely to occur and the withdrawal of 20-30 c.cm. of cerebrospinal fluid. If the fluid withdrawn is turbid the meningitis is likely to be of the cerebrospinal type due to the meningococcus, or it may be pneumococcal or even streptococcal. Stained films will distinguish between these forms, but in each case repeated daily lumbar puncture should be done, with the withdrawal of as much fluid as will flow readily, and then give an intrathecal injection of 20 c.cm. of anti-meningococcus serum. If the meningitis is secondary to mastoid disease, or following an operation on the nasal cavities, or fractured base, or cellulitis, then it is usually due to streptococcus infection, and the chances of saving your patient are very slight, though the cerebrospinal fluid should be drained by repeated lumbar puncture, twice daily, and hexamine administered by the mouth in grs. 20 doses t.d.s. in a tumblerful of water. Antistreptococcus serum is of probably doubtful value, though it may be tried.

Headache in cerebral tumour may be intense, calling for urgent relief. Lumbar puncture here is dangerous, because of the great risk of the increased pressure in the ventricles forcing the medulla and pons into the foramen magnum, with a fatal result. Morphia also is dangerous if there are signs of commencing torpor, but aspirin and phenacetin may be used safely. Certain relief may be obtained by puncturing the lateral ventricles, but this is an expert surgical procedure, and gives only temporary relief, unless followed by an extensive decompression.

Pyrexia of 101°-103°F. with cerebral symptoms of headache, torpor, and even delirium and coma may be the initial stage of an acute poliomyelitis, so that it is important to watch the muscular tonus of the limbs for the onset of a flaccid palsy. The deep reflexes will probably be lost, but sensation is unimpaired. The paralysis may spread widely during four or five days, though the ultimate permanent paralysis and muscular atrophy is usually much less in extent than is present in the first week. In young children there is often little or no pain, and in some cases the sudden onset of paralysis of a limb is the first symptom. In young children, too, scurvy rickets may simulate acute poliomyelitis on account of the muscular weakness, and I have known of a case in which the practitioner cured his little patient with potato and fresh milk after a leading neurologist had diagnosed infantile paralysis. Thus may too narrow a specialism defeat itself. Unfortunately little can be done either to avert poliomyelitis or to arrest the development of the spinal lesions and the subsequent muscular paralysis. Serum from a previous sufferer from the disease has been tried many times, apparently without any good effect. During an epidemic of the disease it will be wise to advise all communities, such as school-children, to have the throat and nose sprayed daily with a mild antiseptic. Acute poliomyelitis occasionally attacks adults, and it is then often an extremely painful disease for the first few days, usually being mistaken for neuritis, malaria, dengue, or influenza.

During epidemics of poliomyelitis there is often seen an increase in the number of cases of herpes zoster. This is probably also due to a filter-passer

virus, and it has a special relationship to the virus of varicella, innumerable cases of apparent infection of the one disease from the other being recorded. When zoster attacks the trunk, the onset of unilateral pain should give the clue, and it is wise to warn the patient that presently an eruption in the region of the pain is likely to occur, lest the rash when it appears is attributed to the treatment, and a change of doctor called for. Zoster is especially liable to affect the ophthalmic branch of the trigeminal nerve, and the pain may be agonizing. If the vesicles attack the cornea, severe scarring, perforation, and blindness may result, or iritis and even optic neuritis are met with. An ointment of zinc cream containing cocaine and chloral hydrate should be used for the painful rash, which should then be dusted over with boric powder and starch. Morphia may be necessary to give rest and sleep in severe cases, though this should not be continued for more than a few days owing to the danger of formation of an addiction habit. In old people *post-herpetic neuralgia* is exceedingly common and is very difficult to treat. Morphia should be avoided and reliance placed on milder sedatives such as bromide, and hypnotics, including allonal, adalin, and many others of this type, changing the drug every week. Operative treatment is useless, and alcohol injection is also as a rule useless in the spinal cases, though occasionally Gasserian injection is helpful in the trigeminal cases, when in addition to the pain there is troublesome hyperæsthesia.

Modern Methods of Treating Pulmonary Tuberculosis

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THE mortality from pulmonary tuberculosis in 1901 in England and Wales was 41,224, or 1,263 per million deaths, while in 1929 it had declined to 31,425, a standardized rate of 738 per million. A consideration of the modern methods of treatment in this disease which have contributed to this reduction in mortality may prove of some interest.

THE SANATORIUM

Although not a modern method of treating pulmonary tuberculosis, the sanatorium is worthy of special mention because of the great advances made in recent years in promoting a more happy and contented atmosphere among the inmates. In few other diseases is a peaceful and contented mind of such importance as in pulmonary tuberculosis, partly by reason of the long periods of institutional treatment necessary and partly because complete bodily rest is impossible in the presence of a fretting and discontented mind. The recognition of this fact has led to the provision in modern sanatoria of many social and occupational amenities which do much to reconcile the sufferers from this disease to long periods of institutional treatment with its inevitably monotonous daily routine. The beneficial effect produced by congenial occupation for mind and body on their health and progress while in the institution is surprising, and the knowledge gained from the instruction given is often turned to good financial effect after the patient has returned to his or her home.

The foregoing describes a few of the changes made in recent years which add to the patients' comforts and pleasures, and which have, by promoting a happy and contented atmosphere and combating introspection, enabled many to carry out the long periods of sanatorium treatment necessary to secure arrest of the disease in the more advanced type of case.

AFTER-CARE

The development of the highly organized and efficient system now in operation for the welfare or

supervision of a patient after leaving a sanatorium is a milestone in modern treatment. The facilities for the maintenance of artificial pneumothorax or oleothorax cases, and the placing of ex-sanatorium patients in suitable employment with a continuation of regular medical supervision at local dispensaries, are but a few of the items dealt with by this valuable public service.

Having now briefly reviewed the more important recent advances in the regime of sanatoria to which a sufferer from pulmonary tuberculosis must conform, we may consider some of the specialized forms of modern medical and surgical treatment for this disease, and in which such striking advances have been made.

Speaking broadly, the results of such treatments lie almost as much in the hands of the general practitioner as they do in those of the specialist who is responsible for the actual technique; for success depends very largely upon the early diagnosis of an active tuberculous lesion, and the onus of this falls most heavily upon the family doctor. In dealing with any suspicious case of phthisis, the knowledge must be kept constantly in mind that the clinical diagnosis of pulmonary tuberculosis depends on the presence of a symptom complex, such as general lassitude and malaise, loss of weight, cough and, later, associated sputum, with or without clinical signs in the lungs. A positive diagnosis is placed beyond all doubt if tubercle bacilli are found in the sputum (if necessary using the antiformin method on a twenty-four hours' collection), or an area of infiltration is shown by a good radiogram.

INJECTION THERAPY

Under this heading certain substances require mention notably preparations of calcium, and various gold preparations.

THE GOLD SALTS

Gold salts have a definite place of some importance in the modern treatment of pulmonary tuberculosis, and providing that suitable cases are selected and due care exercised in the administration of the drug excellent results may be obtained. The salts employed are numerous, and the following may be mentioned: allocrysine, lopion, krysolgan or supragol, triphal, solganal, solganol B, crysodal, crisalbine and sanocrysin, although only the two latter call for detailed mention. The gold content of these preparations varies from 33.7 per cent to 50.96 per cent.

Möllgaard was the first to obtain gold sodium thiosulphate in a pure state, and he gave it the name of sanocrysin. The original preparation introduced in 1924 by Möllgaard for the treatment of phthisis is the salt most widely used in this country, and the most noticeable effects of this preparation, when a course is given by the intravenous route, is the elimination of tubercle bacilli from the sputum, while fibrosis and healing are promoted in the diseased areas.

The use of sanocrysin is indicated in the following types of case:—(1) Early infiltration affecting one-third or more of both lungs, especially if associated with tubercle bacilli in the sputum. (2) In conjunction with artificial pneumothorax, thoracoplasty or other form of collapse therapy in cases where the uncollapsed lung shows signs of early disease while the contralateral lung is in such an advanced stage that some form of collapse therapy is essential. (3) Its use has also been advocated in cases of acute tuberculous pleurisy. Speaking broadly, cases showing active breaking down of lung tissue with advancing excavation are unsuitable for treatment with gold salts.

In those cases where disease in both lungs is moderately extensive, but excavation is present on one side only, it may be wise to give a course of sanocrysin, and if a favourable result is obtained, as judged by the improvement in clinical and radiographic findings, to proceed to collapse the excavated and

more extensively diseased lung by artificial pneumothorax or phrenic evulsion. If necessary this treatment may be combined with a second course of sanocrysin, or small doses (*e.g.*, 0.15 gram) may be given at weekly intervals for some months, and the patient, if afebrile, allowed to get up and take moderate exercise regularly.

The technique of sanocrysin administration is a simple one, the drug being given by the intravenous route. A gradually increasing dose given at weekly intervals is a simple and efficacious method, the drug being made up at the time of administration in warm freshly-distilled water to such a strength that each c.c. of solution contains 0.05 gram of the pure crystalline salt. Individual opinions differ widely regarding the exact dosages to be used, but the following amounts have been found in practice to give good results in most cases without causing any severe toxic reactions: 0.05 gram, 0.1 gram, 0.15 gram, 0.25 gram, 0.35 gram, 0.4 gram, 0.5 gram. This last dose will be reached, if no complications have arisen, by the seventh week of the course if injections are being given weekly as advised above. This dose is then injected each week until a total amount of six to seven grams has been given. This constitutes a complete course.

Some authorities have advocated using the drug in the same way as a vaccine and giving a slightly increased dose as soon as the pyrexia, if any, which has followed the preceding injection has subsided. The results obtained by this method do not appear to be appreciably better than those obtained by the simpler routine of an increasing weekly injection as already described. Whichever technique is used the patient should be kept in bed for the first few days after the injection, and a convenient method, if the routine of weekly injections is followed, is confinement to bed for the first four days after the administration of the drug and then a maximum of three hours up per diem during the next three days, at the end of which time another injection is given.

The urine should be carefully tested for albumen before the course is started and for four days after each administration, while a sharp watch is kept for the appearance of any toxic phenomena. The toxic phenomena which may occur during the course of sanocrysin are numerous, but seldom serious, fatal reactions being extremely rare. The treatment of toxic symptoms is chiefly symptomatic, while the elimination of the drug by other channels is encouraged, *e.g.*, purgation, diuresis and sweating. The results of this treatment, providing that care is taken in the selection of suitable cases, are encouraging, and in a recent survey of a series of one hundred consecutive cases treated by sanocrysin nearly 50 per cent showed clinical improvement, together with the disappearance of tubercle bacilli from the sputum.

COLLAPSE THERAPY

The greatest advances in treatment of recent years have, however, been chiefly concerned with various forms of collapse therapy, and this valuable method must next be considered in all its aspects. It is wise to bear in mind that all procedures discussed under this heading should be regarded as surgical operations, and due attention paid to securing an efficient aseptic technique.

ARTIFICIAL PNEUMOTHORAX

In order to secure good results with this form of treatment the careful selection of suitable cases is of prime importance, and it is in this direction, coupled with the perfection of a rigidly aseptic or antiseptic technique and recognition of the importance of regular radiographic examination, that the greatest advances have been made in recent times.

Briefly, the cases in which unilateral artificial pneumothorax is indicated may be classified as follows:—(1) Moderately advanced unilateral disease in an active state, with or without excavation. (2) As in

(1), but with early disease affecting the apex or middle zone of the contralateral lung, in which case the treatment is advantageously combined with a course of sanocrysin, although in some of these cases collapse of the more affected lung is followed by clearance of disease on the opposite side. (3) In actively advancing bronchio-pneumonic and caseous pneumonic types, if unilateral. (4) In severe hæmoptysis in which the site of bleeding can be accurately localized. (5) For the relief of pain in pleurisy. (6) Certain cases of tuberculous pleural effusion and empyema. (7) Cases of laryngeal involvement in which pneumothorax appears suitable on other grounds should be induced at an early stage. (8) In those cases where the social or economic conditions of the patient render prolonged institutional treatment undesirable, and the case is suitable on clinical grounds.

Certain conditions may contraindicate artificial pneumothorax treatment, notably advanced asthma and emphysema, renal disease of an advanced degree (not tuberculous in nature), and advanced intestinal tuberculosis. The technique of artificial pneumothorax is too well known to require detailed description, but it cannot be urged too strongly that all aseptic and antiseptic precautions must be taken to prevent any risk of infection of the pleural space during the stage of induction or subsequent refills. Careful anaesthetization of the parietal pleura is important in avoiding the risk of pleural shock, and in this connection an injection of atropine (gr. 1/100) is of value if given about half an hour before the induction or refill is attempted, while in the former case it may with advantage be combined with morphia (gr. 1/2).

Air should never be introduced so rapidly as to cause any marked swing or displacement to occur in the mediastinum, and the amount given should be regulated so as to secure as good and complete a pulmonary collapse as possible without occasioning any cardiac displacement or throwing an undue strain on the contralateral lung. In this connection the importance of regular screening under the x-rays, if possible before and after each refill, cannot be over emphasized, and a sharp watch must also be kept on the condition of the contralateral lung. Adhesions which prevent adequate collapse of the lung or of an underlying cavity should, if practicable, be divided (*vide infra*).

The complications attending pneumothorax inductions or refills are: pleural shock, gas embolism, surgical emphysema, perforation of the lung, and cardiac accidents such as syncope or cardiac puncture. All these are of relatively rare occurrence. In all those cases where a full artificial pneumothorax is indicated and possible, the degree of collapse attained should be as complete as possible, but gross cardiac or mediastinal displacement must be avoided.

Complete collapse is desirable, as it secures the maximum rest for the diseased lung with resultant healing, the evacuation of the liquid tuberculous contents (as sputum), and reduces the risk of pulmonary rupture from coughing or straining. It also tends to reduce the liability to auto-inoculation, with resultant activation of tuberculous foci in other parts of the lungs, and spread of disease, which sometimes follows refills on an incompletely collapsed lung. As already stated, the optimum degree of collapse for any individual case can only be ascertained by careful and frequent x-ray examinations.

It is impossible to give any definite rule regarding the length of time an artificial pneumothorax should be maintained, the period varying from two to six or more years, and it should be decided for each individual case after careful consideration of the presence or absence of activity, the degree of disease present in the lung prior to the induction of the pneumothorax, and the social and economic status of the patient.

THORACOSCOPY AND DIVISION OF ADHESIONS

In some cases of artificial pneumothorax it is found impossible to obtain a good collapse owing to adhesions

which prevent the lung being compressed to the optimum degree by holding it tethered to the chest wall.

If the adhesions are situated over a cavity in the lung they may prevent its obliteration by the pneumothorax. In all such cases the possibility of securing a good collapse by dividing the adhesions should be considered, for as has been already pointed out, the maximum degree of collapse which can be obtained without causing cardiac or mediastinal displacement, or unduly straining the opposite lung, is the optimum if a satisfactory healing of the disease is to be obtained.

OPEN INTRAPLEURAL PNEUMOLYSIS

In those cases where owing to the size, position, density or number of the bands to be divided cauterization is impracticable, the pleural cavity may be opened under a general anaesthetic. Access is usually obtained through an intercostal space, and the adhesion divided. This method has the advantage that hæmorrhage is easily controlled, but the risk of infecting the pleural cavity is increased with liability to serous effusions, and even empyema. In some cases, however, excellent results have been obtained.

OLEOTHORAX

The oil used consists of liquid paraffin or olive oil containing oil of gomenol to the extent of 2 per cent to 6 per cent according to the type of case, the higher strengths being used in those where an antiseptic action is required. For all general purposes oil containing 2 per cent of gomenol oil is used. The indications for oleothorax are: (1) Pleurisy complicating pneumothorax; (2) obliterative pneumothorax or incomplete collapse of the lung or an underlying cavity; (3) mediastinal laxity combined with exaggerated pleural elasticity; (4) as a substitute for pneumothorax; (5) pleuro-pulmonary perforations.

The general technique adopted is as follows:—In all cases as complete an artificial pneumothorax as possible should be established before the introduction of oil. A preliminary injection of two to five cubic centimetres of oil should be given to test the susceptibility of the patient. If no intolerance is observed, 25, 50, 100 and then 300 to 500 c.c. may be given, allowing an interval of a few days between each injection, until the air in the pneumothorax space has been completely replaced with oil. If any reaction is observed advance must be made slowly. While the oil is being injected through a needle inserted into one of the lower intercostal spaces the air in the pneumothorax is sucked out through another needle at the apex by reversal of the bottles of the pneumothorax apparatus. The intrapleural pressure is adjusted at the end of each operation to a mean of zero. The oil should be run in at body temperature through a short needle with a bore of 1 to 1½ mm. For the injection of the larger quantities of oil a Dieulafoy's two-way syringe of 100 cubic centimetre capacity, or one of the special oleothorax apparatuses now on the market, may be employed.

If the oleothorax is being given for a tuberculous pleurisy the injections should not be made during the acute stage, while if a serous effusion is present the introduction of oil should be preceded by a gas replacement.

If the patient is being treated for a purulent effusion preliminary gas replacement followed by a pleural wash-out with some mild antiseptic, e.g., 1 in 4,000 acriflavine solution, should be the method of choice. The wash-outs may with benefit be repeated five or six times, with about five-day intervals, before the oil is introduced. In these cases paraffin containing 5 per cent to 10 per cent of gomenol has been advocated, but the risks of complications due to the latter are correspondingly increased.

Where obliterative process in an artificial pneumothorax indicate oleothorax treatment, any adhesions which can be divided should be dealt with before oil

is introduced, for the more complete the initial pulmonary collapse, the better the results of the oleothorax will be. The results of filling the various loculi in loculated pneumothorax cases have been most disappointing, and this procedure is not to be recommended.

In cases where exaggerated pleural elasticity with resultant instability of the pneumothorax is associated with mediastinal laxity, which precludes large refills being given owing to cardiac displacement occurring, the introduction of about 40 to 50 c.c. of 2 per cent gomenol by small amounts gives excellent results. In cases of pneumothorax where the patient will experience difficulty in obtaining refills after leaving the sanatorium (e.g., prospective emigrants), an oleothorax may be substituted. The use of gomenol for promoting closure of a pleuro-bronchial fistula is rather a questionable procedure, although some encouraging results have been reported.

The after-care of oleothorax patients is a matter of the first importance. Careful routine x-rays, clinical examinations, and periodic observations of the intrapleural oil pressure, and the giving of small refills should this begin to fall, are essential. Should fluid develop under the oil it should, if serous, be removed and replaced by more gomenol, while if found to be purulent on more than one occasion after replacement the pleural cavity should be drained of oil and pleural wash-outs given at intervals until the space is sterile. The oleothorax may then be re-established or a gelatinothorax (*vide infra*) contemplated. Various complications and accidents may be met with in the course of oleothorax treatment.

Initial fever varying from 99° to 104°F. may occur, accompanied by pain owing to pleural irritation by the oil. In the later stages of the treatment pyrexia may be due to the formation of fluid under the oil. Nephritis has been recorded, and this is possibly due to excretion of gomenol by the renal tubules in excessive quantities.

Perforation of the lung may occur if, owing to the formation of fluid beneath the oil, the intrapleural pressure is raised to a point where rupture into the pulmonary tissues takes place. This will only occur if clinical signs are ignored and careful x-rays and the general after-care of the case are neglected. More rarely perforations owing to renewed activity of the disease in areas lying under the visceral pleural surface may occur. In such cases evacuation of the oil and performance of a thoracoplasty is indicated, if possible on general considerations. In this connection it cannot be urged too strongly that no case in which the contralateral lung is not free of any appreciable degree of active disease should be treated by oleothorax. The method is, however, a very valuable complement of artificial pneumothorax if it is used with due care and judgment. The recent progress in the surgical treatment of pulmonary tuberculosis and complications of artificial pneumothorax has caused many of the indications for oleothorax which, other means lacking, were thought to be proper a few years ago to be abandoned.

In certain cases oleothorax has proved a failure, chiefly as a treatment for infected pleural effusions, and the method of gelatinothorax has been introduced in an attempt to improve the results. The medium consists of a sterile solution of 5 per cent of gelatin in normal saline with the addition of acriflavine to a strength of 1 in 2,000. The pH of the whole solution is adjusted to eight, and the solution sterilized and put up in ampoules.

SURGICAL MEASURES

We may now turn to the consideration of the surgical treatment of pulmonary tuberculosis, which is a natural corollary of artificial pneumothorax, although its advent actually preceded that of the latter by quite a definite interval, the resection of ribs with a view to obtaining some degree of pulmonary collapse being carried out by de Cernville as early as 1835.

The indications and contraindications for surgical interference are similar to those of artificial pneumothorax, but demand a much stricter interpretation of the case, especially as regards the activity of the disease, if any, in the contralateral lung. Brauer sums up the essential points excellently in the form of four questions, namely: (1) Can the patient recover without operation? (2) Will the contralateral lung stand the operation? (3) Is the pleura adherent? Test it. (4) Is the general condition of the patient and the state of the other organs good enough? With these preliminary remarks, and the reminder that the careful selection of suitable cases is of prime importance if good results are to be obtained, the individual surgical operations may be considered in detail.

OPERATIONS ON THE PHRENIC NERVE

The excellent results following operations on this nerve, coupled with the minor nature of the operation itself and the absence of any necessity for a general anæsthetic, have deservedly popularized these operations in selected cases. The object of the treatment is to give rest to the diseased lung, and this may be temporary or permanent, according to the technique adopted. Temporary paralysis of the diaphragm may be secured by either of the following methods: (1) crushing the phrenic nerve in the neck; (2) injection of alcohol into the nerve; while permanent paralysis of the muscle is secured by (1) phrenic evulsion; (2) phrenicotomy (it should be noted that in the small percentage of cases regeneration of the nerve may occur after division only of the main trunk, with recovery of function), provided that in each of the latter operations any accessory phrenic nerve is looked for and, if present, divided.

The indications for operation on the phrenic nerve may be broadly summarized as follows: (1) Failure to induce an artificial pneumothorax. (2) In pneumothorax cases where adhesions are causing trouble by traction, and cannot be dealt with by cauterization or other methods. (3) In artificial pneumothorax cases in which obliteration is beginning or has occurred. (4) In artificial pneumothorax cases which are being abandoned: (a) after more than two years; (b) where excavation is or was present; (c) where an abnormally complete pneumothorax is to be allowed to re-expand. (5) As an invariable preliminary to complete thoracoplasty. (6) In cases with bilateral disease where a bilateral selective pneumothorax cannot be obtained on more than one side. (7) Where artificial pneumothorax is contraindicated owing to heart disease or bronchitis. (8) Where the mentality of the patient is in doubt, or pneumothorax is refused in an otherwise suitable case. (9) As an adjunct to an artificial pneumothorax where only a partial degree of collapse can be obtained; but this has given a good functional result. (10) In certain cases with purely basal disease, with or without excavation, the method may be used instead of an artificial pneumothorax. (11) The relief of troublesome symptoms, notably cough, vomiting or hiccough.

The indications for the temporary or permanent operation are similar, but in the former advanced and active disease in the contralateral lung renders a permanent phrenic, with the permanent increase in the strain on that organ, undesirable. The former is also indicated where the disease is so slight that a permanent paralysis of the diaphragm on the affected side appears undesirable. In some cases where bilateral disease is present and it is impossible to induce a pneumothorax on either side, a bilateral crushing of the phrenic nerve may be of value. About three weeks should elapse between the two operations.

The operative technique employed is simple. The phrenic nerve is exposed under local anæsthesia as it lies on the anterior surface of the scalenus anticus muscle. If a permanent paralysis of the diaphragm is desired about three to seven inches are evulsed, or if this is impracticable the main trunk is divided, while if a temporary result is required about a third of an inch of the main trunk is crushed, but not

actually divided. In all cases any accessory branches should be looked for and divided. In locating the main nerve trunk or the accessory branches the illuminating retractors devised by H. P. Nelson will be found of great assistance. If the nerve is crushed and not evulsed it is a good plan to tie a loop of sterilized black silk loosely round the main trunk. This greatly facilitates finding the nerve again should a permanent operation become desirable at a subsequent time. The complications following operation on the phrenic are negligible beyond occasional local sepsis. In those cases where a temporary operation has been done recovery of the diaphragmatic movements occurs about six months later. The degree of change noticed in the diaphragmatic movements after a successful operation, when the patient is examined under the x-rays, varies from immobility with no rise in level to a rise of three or more inches with marked paradoxical movement.

THORACOPLASTY

In considering the question of thoracoplasty it should be emphasized at the beginning that the operation is a serious one, causing considerable mutilation not only to the patient's body but for a time at least to his psychology and mental balance. Moreover, extreme care must be taken in the selection of cases for this method of treatment, and any case showing more than a limited amount of quiescent or arrested disease in the contralateral lung is, broadly speaking, unsuitable for this operation owing to its irrevocable nature and the risk of extension in the opposite lung which often follows the rapid compression of the more diseased side. The preliminary phrenic evulsion which should precede any operation for complete thoracoplasty is of great value by acting as a test for the quiescence or otherwise of the disease, if any, in the opposite lung. The operation should not be done in any patient over forty-five years of age, and is contraindicated in all exudative cases.

Other surgical procedures that have been advocated and that are suitable in certain cases are scalenectomy, intercostal neurectomy, pneumolysis and pneumonotomy.

SUMMARY

(1) An attempt is made to present the results of personal experience and the general consensus of opinion on various modern methods of treating pulmonary tuberculosis. (2) The importance of an early diagnosis is emphasized. (3) The indications for technique of, and complications following, various treatments are discussed.

The Therapeutics of Malaria

THIRD GENERAL REPORT OF THE MALARIA COMMISSION
(Abstracted from the *Quarterly Bulletin of the Health Organization of the League of Nations*, June 1933, Vol. II, No. 2)

GENERAL AIMS

1. It has always been common knowledge that a large proportion of those who suffer from malaria in poverty-stricken countries never get any specific treatment for their disease. The League of Nations' Malaria Commission, when it was created in 1923, decided to collect information on the subject and to endeavour to discover how it might be possible to provide treatment for those victims. At that time, of course, 'treatment' was synonymous with 'quinine' (for no other specific was available), and the problem was therefore how to provide those people with quinine. It was realized that the cost of quinine itself was only one among many reasons why the people lived and died without the drug; but it was thought that, if by some means or other, a world reduction in the price of quinine could be brought about, something at least would have been accomplished.

2. In starting out with this aim (how to reduce the price of quinine) the Commission was embarking on

an economic rather than on a medical problem, but there was one way in which it could be approached from the medical side. Perhaps it might not be necessary after all to employ pure quinine. Perhaps one or more of the other alkaloids in cinchona bark might be sufficiently effective, as shown by the large experience in India; or perhaps a mixture of all the alkaloids in a cheaper species of bark than that used commercially for the extraction of quinine might serve.

3. The Commission collected all available information on these and related subjects and a great deal of research on total alkaloids and alkaloid mixtures was undertaken under its auspices. The position was then fully discussed at two conferences held in London and Geneva. As a result, it was decided to suggest the preparation of a new cinchona product to be called 'Totaquina'. This product was to be a mixture of all the alkaloids in cinchona bark standardized to contain not less than 70 per cent of the crystallizable alkaloids, of which not less than 15 per cent must be quinine, with not more than 5 per cent of moisture and 5 per cent of mineral matter. In actual commercial practice, two types of preparation complying with this specification can be made—namely: *Type I*, made by extracting and precipitating as an almost white powder the total alkaloids from the bark of *C. succirubra* or *C. robusta*, which can be cultivated abundantly in almost every malarious country; *Type II*, made by utilizing the residues remaining after quinine sulphate has been extracted from *C. ledgeriana* and bringing the preparation up to the required standard by adding sufficient quinine and other crystallizable alkaloids.

4. Samples of the two types were obtained and were analysed independently by Dr. Groothoff and Dr. Henry and tested for their antimalarial activity on bird malaria by Professor Giemsa. These three experts then drew up a scheme for the specification of totaquina and for its analytical control, which, on the recommendation of the Health Committee, was forwarded to committees responsible for the issue of national pharmacopœias with a view to the insertion of the new preparation in those publications. This has been done in the new edition of the British Pharmacopœia issued in 1932.

5. On the medical side of the problem, the next task was to supplement Professor Giemsa's study of the antimalarial activity of totaquina in bird malaria by clinical investigations of its remedial action on cases of the disease in man. This enquiry has been commenced, but the trials reported are as yet too few to enable the Commission to make definite recommendations on dosage, mode of administration and other details.

6. While this work was proceeding, two events of outstanding importance in the history of malaria research occurred. The first was the late Dr. Roehl's routine application on a large scale of a method which he had devised for seeking antimalarial remedies by testing numerous quinine and quinolin derivatives to ascertain whether any of them were effective against the parasites of bird malaria. The second was the application of the practice of malaria therapy to the study of malaria itself as well as for its original purpose. These events quickly led to great advances in knowledge on both the chemical and biological aspects of malaria and to a change of thought and opinion on the aims and methods of antimalarial treatment and prevention.

7. On the chemical side, an epoch-making advance was the discovery of synthetic preparations which give promise of being more effective therapeutic and prophylactic agents than quinine.

On the biological side, additions to knowledge have been no less important, although they may appear less spectacular. For example, as regards quinine, its merits and defects as an antimalarial agent have been, for the first time, clearly defined and described. It has been shown that, although quinine suffices in large

measure to satisfy the practising physician by virtue of its action on the asexual stages of the parasite which are responsible for the fever and other clinical symptoms of malaria, it has three grave defects from the point of view of preventive medicine. It does not destroy the sporozoite stage of the parasite, which is responsible for infection; it has only a slight action on the sexual stage, which is destined to continue the life cycle of the parasite in the mosquito, and its curative effect is not always permanent, for the disease is liable to recur within a short or a long period after cessation of treatment. It has been shown, further, that, even as regards the use of quinine by the practising physician for the cure of malarial attacks, the time has passed when it can be considered satisfactory or sufficient to make a diagnosis of 'malaria' and to begin at once a 'standard quinine treatment'. Nor is it sufficient to know the species of parasite concerned and to prescribe the particular system of quinine treatment which, up to now, has been considered most appropriate for an infection of that type. What has to be done now is to endeavour to learn much more about the case than has been customary hitherto. It has become all important to know what is, in general, the clinical virulence of the particular strain of the parasite with which the patient is infected, what is the usual course of the disease in treated and untreated infections with that strain, and what is the patient's status as regards tolerance or immunity to its clinical effects. For, to existing knowledge that some species of the malaria parasite are much more virulent to the human host than others has been added the information that there is a difference between the clinical virulence of different geographical races or strains of the same morphological species. This finding has an important bearing on treatment. It serves to explain contradictory observations on the therapeutic efficacy of the same form of treatment conducted in different countries and on the comparative value of different systems of quinine administration, as well as divergent views on the relative amenability to quinine treatment of the different species of the malaria parasite. Also, to existing knowledge that persons who suffer repeatedly from malaria gradually acquire a tolerance or immunity to the disease has been added the information that this tolerance is specific to the particular species and strain of parasite concerned and that by too intensive or too early treatment with quinine the patient may be prevented from acquiring that tolerance and so may continue to suffer for a very long period from the relapses which are such a troublesome and debilitating feature of malarial fever. Again, as regards the common practice of taking a 'prophylactic' dose of quinine daily, the manner in which this dose acts (by mitigating or suppressing the clinical symptoms rather than by preventing infection) has been ascertained and defined so clearly that there is no longer doubt or confusion on the matter, and no longer any reason for advocating or for condemning the practice in all circumstances, or for inability to define the conditions in which the practice should still be advised and the period over which the doses should be taken. Thus, in the prophylactic as well as in the therapeutic sphere, the new knowledge obtained about the action of quinine, while it increases the responsibilities of physicians and public health workers, should enhance greatly the benefits which the discovery of this natural product has already conferred on millions of people.

8. And, of course, this new knowledge about quinine is not rendered unnecessary, nor is its practical utility lessened, by the discovery of synthetic drugs which may in some respects be more effective antimalarial agents. For, in practical antimalarial work on a large scale (which is the work with which the Malaria Commission is primarily concerned), the question of competition between the old remedies and the new does not arise. The aim of large scale antimalarial effort by means of drugs is not concerned with providing a medicine which is the most effective antimalarial

remedy known to medical science. What is aimed at is to provide a remedy that is so abundant and can be obtained so cheaply that it can be made readily available to the whole population of malarious countries. The endeavour of the Malaria Commission is to arrange a scheme of that kind. In such a plan there is no question of providing the most effective remedy known, nor even, necessarily, of providing a remedy as effective as quinine. The object is simply to provide, preferably by local cultivation of *C. succirubra*, or by other action in the malarious countries themselves, an abundant supply of a medicine which will mitigate the severity of malarial attacks and prevent the disease from terminating fatally. This, of course, is a limited aim, but it is often all that can be hoped for in the numerous poverty-stricken localities where malaria prevails. Moreover, a therapeutic policy designed to reduce the severity and fatality of the disease rather than to eliminate the parasites radically and completely is one that, in existing circumstances in some severely affected countries, can be justified on scientific grounds. It is known, for example, that in some localities in Africa and other tropical countries, the entire native population above one year of age harbour malaria parasites in their blood continuously, although no one above a few years of age suffers any appreciable illness attributable to the parasitic infestation. The latter result is due—as has been proved by laboratory investigations made in connection with the practice of malaria therapy—to the fact that many persons who are repeatedly infected and reinfected with malaria quickly become immune to the clinical effects of the infecting organisms although the parasites themselves survive and continue their life cycle in the human host. This condition of acquired immunity resulting in freedom from malarial disease after childhood is advantageous to the populations concerned, and radical interference with the process by which it comes about might be most unwise. Evidently, what is needed in localities of that kind is intensive systematic enquiry into the clinical aspect of the subject for the purpose of ascertaining precisely at what period of life temporary curative measures are urgently necessary or would be most helpful. It might well be that the best interests of the indigenous inhabitants of these countries would be served by providing them with a remedy such as totaquina rather than with one which, by its more potent curative or protective action, would prevent them from acquiring during infancy and early childhood the immunity of the disease which is so valuable during the working years of life.

9. At the same time, of course, the Commission appreciates fully the great benefits that would be derived from the power to fight malaria with more drugs than the cinchona alkaloids and especially from the ability to fight it with preparations which may be effective for particular purposes for which quinine is known to fail. Although quinine is one of the most remarkable drugs in the world, it has to be admitted that, as an antimalarial agent, it has several grave defects which are the more apparent when attempts are made to utilize the drug for preventive work on a large scale. It is common knowledge that after the discovery of the mosquito cycle of the malaria parasite, several workers believed that the best hope of overcoming malaria on a large scale lay in an endeavour to break the epidemiological chain by treating the human host rather than by measures aiming at the destruction of the insect carrier. That view has since received support from the success which has attended medicinal measures against kala-azar and bilharziasis, but, as regards malaria, field experiments on a similar plan have always failed because taking quinine, although it cures developed attacks, does not always prevent either man or mosquito from becoming infected. It is reasonable to suppose that, if a drug possessing that property were available, a repetition of Koch's field trials might have a very different result.

Whilst the original object of enquiry by the Commission was the treatment of poor populations by quinine, it is impossible to overlook the importance of the treatment of malaria in general, whether of the individual or of communities and under all conditions. Here also the discovery of new drugs which are more effective for particular purposes than quinine has a very great value.

The above are the principal justifications for chemotherapeutic research and experiment.

Mixtures of cinchona alkaloids

The Commission, assisted by an expert committee, which included Sir Henry Dale, Sir David Prain, Mr. Howard, Mr. Blagden, Dr. Henry and Dr. Wenyon, has endeavoured to disentangle the confusion which exists with regard to the names and composition of mixtures of the cinchona alkaloids commonly used as antimalarial remedies. Their conclusions, briefly stated, are :—

(a) The name 'quinetum' should be reserved for a preparation consisting of quinine, cinchonidine and cinchonine in equal parts. If this preparation were made by extracting those alkaloids from the bark of *Cinchona succirubra* (which usually contains them in approximately equal quantities), only a small addition of one or other of the crystallizable alkaloids would be necessary in order to equalize the amount of each alkaloid in the preparation.

(b) Instead of continuing to use the name 'cinchona febrifuge', which in the past has been applied to alkaloidal mixtures of very different composition, it is suggested that a new *standardized* preparation containing all the alkaloids in cinchona bark should be recommended for general use in treating malarial populations, and that its name should replace the name 'cinchona febrifuge'. The new preparation should be standardized to contain not less than 70 per cent of crystalline alkaloids, of which not less than 15 per cent must be quinine. The amount of amorphous alkaloids must not exceed 20 per cent, mineral matter not more than 5 per cent and water not more than 5 per cent. The name suggested for this new preparation is 'totaquina'. Here all that is required is a record of the few preliminary clinical tests which have been made with the preparation and a recommendation that it should be tried in the field on a large scale. The composition (approximately) of available samples of the two types of totaquina is as follows :—

	Type I, made by extracting the total alkaloids from cinchona bark		Type II, made by adding to the residues of quinine manufacture sufficient alkaloids to bring the preparation up to the required standard
	<i>C. succirubra</i>	<i>C. robusta</i>	
	Per cent	Per cent	Per cent
Quinine ..	25.23	28.46	14.79
Cinchonine ..	27.67	16.00	55.11
Cinchonidine ..	34.13	47.53	7.10
Quinidine ..	..	..	6.21
Total crystallizable alkaloids.	87.03	92.0	84.2
Amorphous alkaloids.	8.86	3.70	10.47
Moisture ..	0.99	1.00	1.77
Ash ..	0.63	1.67	2.13

It will be seen that, while the alkaloids in type I are chiefly quinine and cinchonidine, the chief alkaloid in type II is cinchonine. Also, type II contains quinidine, which is not present in type I and it contains a larger amount of amorphous alkaloids.

On account of their different alkaloidal contents, the therapeutic properties of types I and II must be considered separately.

Results of tests on bird malaria

Professor Giemsa has made toxicity and therapeutic tests of samples of each type in comparison with quinine and hydroquinine by the method of Roehl. The results showed that all the samples tested (three of type I, one of type II) were a little more toxic when injected intravenously into rabbits than hydrochlorate of quinine administered in the same doses, and that, as regards their therapeutic action on the parasites of bird malaria (*P. relictum*), all of them were inferior to quinine. The sample which contained the largest amount of quinine (a preparation of type I containing the total alkaloids of *C. robusta*) was the most active therapeutically, and the two samples of type I containing the total alkaloids of *C. succirubra* came next. The sample of type II made from the residues of quinine manufacture and which contained less quinine but more cinchonine than any of the others was found to be least effective therapeutically. Professor Giemsa concluded that the therapeutic action of the preparations was directly proportional to the amount of quinine which they contained.

Results of tests on human malaria

Tests on benign tertian malaria, *P. vivax*, intentionally induced by the bites of mosquitoes.

The results are very much the same as those obtained by Professor Giemsa in tests on bird malaria. They may be summarized as follows :—

(1) One dose of 5 grains (0.3 gm.) of totaquina of either type has practically no effect on the fever or parasites. It is necessary therefore to use a single dose of 10 grains (0.6 gm.) for the test.

(2) A single dose of 10 grains of totaquina type I produces the same effect in aborting the fever and in reducing the parasites as is produced by a single dose of 5 grains of quinine.

(3) A single dose of 10 grains of totaquina type II has practically no effect in aborting the fever or in reducing the parasites. With this type of totaquina it is necessary to use a single dose of 20 grains (1.2 gm.) to produce the same effect as is produced by a single dose of 5 grains of quinine.

It appears from these results that totaquina type I (total alkaloids of *C. succirubra* or *C. robusta*), when used in ordinary clinical therapeutic doses for curative purposes—e.g., 12 gm. (20 grains) daily for five to seven days—should give about the same good result as is given by quinine in the same doses. If this is so, and if this type of totaquina can be obtained more cheaply than quinine, it would be advantageous to use it for general purposes instead of the single alkaloid.

The following is the method suggested by the Commission for further clinical trials of totaquina:

Procedure

(a) The drug should be administered by the mouth daily in a dose of 0.60 gm. (10 grains) for benign tertian, 1.20 gm. (20 grains) for malignant tertian or quartan. The medicament should be given in tablet form.

(b) Only patients with acute clinical forms of malaria and schizonts circulating in the blood to be treated. The dose should be given under the direct supervision of the doctor.

(c) Continue the treatment of cases by the drug under test or by quinine controlled by daily blood examination until five doses have been taken (five days).

(d) Note carefully and secondary effects, *c.g.*, nausea, albuminuria, etc.

(e) Comparison will be made of the lapse of time required for the complete disappearance of the schizonts from the blood according to a thorough study of the preparations. The blood examinations should be carried out by the same person using the same technique throughout the whole duration of the experiment.

(f) It is desirable to make the experiment on at least fifty patients treated with quinine and on fifty treated with totaquina for each of the three species of parasite. Selection of cases should be made in order that, as far as may be practicable, each group will contain an equal number of cases of the same age and sex in the same stage of the disease.

(g) The description of the dosage, symptoms and results must be written on the special forms provided by the Health Organization of the League of Nations.

(h) The nature of the attack should be determined as accurately as possible. It is desirable, in particular, to know if it is a primary attack or a relapse and for how many days the patient has had fever before the first day of treatment.

Dysphagia

By STANFORD CADE

(From the *Lancet*, 4th November, 1933, Vol. II, p. 1058)

I AM concerned in this lecture with some practical considerations of the common conditions producing dysphagia. From an academic point of view it is no doubt interesting to argue whether some case of difficulty in swallowing is due to spasm of a sphincter or to failure of relaxation of the same sphincter; from the practical point of view it matters chiefly to discover whether the difficulty in swallowing is due to a malignant growth or to some other cause. The only way of differentiating the various cases is by submitting them all to a complete investigation at the earliest possible moment. Age, sex, mode of onset should not be used as an excuse to postpone investigation. In cases of dysphagia there is no justification for 'expectant' treatment. The erroneous impression gained from the literature that dysphagia is not uncommonly due to spasm, aneurysm, cicatricial contraction, or diverticula is due to the fact that such cases are often reported, being interesting and presenting some special feature. In reality they do not account for more than 6 to 8 per cent of all cases, the vast majority being due to a malignant growth. This being the case it is of the greatest importance not to delay diagnosis.

A systematic investigation should consist of the following steps:—

1. *History of the case.*—This should be taken in detail; it will throw a great deal of light on the case. Direct inquiry should be made for trauma, foreign bodies, burns. A statement by the patient that dysphagia has been present for years, that it is intermittent, that it occurred often under emotional strain or with certain foods only should not be allowed to detract attention from the graver possibilities and must not encourage the practitioner to prescribe belladonna and hope for the best. It must be remembered that a long history of slight or intermittent dysphagia does not infrequently precede the development of a neoplasm and that the 'text-book picture' of fairly rapid and relentlessly progressive difficulty in swallowing is not always obtained. With equal caution must be received the statement that dysphagia occurred as 'a bolt from the blue' in the middle of a meal and the first indication was sudden but complete and temporary inability

to swallow. Direct inquiry should be made about: (a) vomiting, its quality, quantity, and relation to swallowing; (b) increased salivation and presence of mucus in the throat; (c) occasional streaks of blood in the sputum; (d) change of voice, however slight.

A carefully obtained history often helps to establish a diagnosis of the rarer causes of dysphagia, but it must never be forgotten that by far the commonest cause is a malignant growth somewhere between the pharynx and the cardia and deliberate search is to be made for it.

2. *Clinical examination* should consist in a systematic examination of the mouth, pharynx, and larynx. The lateral walls of the pharynx, the pyriform fossa, and upper aperture of the larynx should be scrutinized. A pool of mucus behind the arytenoids, or frothy saliva in one pyriform fossa should arouse the gravest suspicion. The presence of cedema or an ulcer make the diagnosis nearly a certainty. A routine examination of the neck, chest, and abdomen should always follow. And lastly, the patient should be given a tumbler of water and swallowing observed.

The accidental discovery of an unsuspected lesion elsewhere should not deter one from a complete examination. The greatest injustice to the patient is a diagnosis of 'functional' dysphagia without the fullest possible examination.

3. *X-ray examination* should consist of: (a) A preliminary skiagraphy of the chest with special attention to the mediastinum. (b) Screening of the œsophagus with an opaque meal of fluid, semi-solid and thick barium. The clinician interested in the welfare of his patient will be present at this examination. The meal should be visualized from the mouth down to the stomach both in the antero-posterior and oblique positions. (c) Films should be taken as they may reveal beyond the actual narrowing of the lumen of the œsophagus, extramural extension of the disease, its size and position.

4. *Œsophagoscopy.*—In careful hands this is a minor procedure. It should never be omitted; it should follow and not precede x-ray examination, and it can give details of the type, size, and extent of the lesion unobtainable by other methods of examination.

The three following points require emphasis: (a) Bougies are dangerous and of doubtful usefulness, and should never be used unless under direct vision through the œsophagoscope. (b) A positive Wassermann reaction does not signify that the patient is free from all other diseases and time must not be wasted in protracted antisyphilitic treatment. (c) A negative result of a biopsy is of little value and should not outweigh clinical evidence.

Success or failure of treatment depends upon early diagnosis. If the lesion is benign, appropriate surgical treatment gives satisfactory results. Early diagnosis offers the only hope in malignant cases. The pharynx offers possibilities for the exercise of surgical skill in a minority of cases. Radiation by radium or x-rays is applicable to a larger group of cases and by modern methods has given encouraging results. The œsophagus is still the realm of experimental surgery and for all practical purposes is beyond the range of successful radiation.

Is the Practice of Contraception Injurious to Health?

By EARDLEY HOLLAND, M.D., F.R.C.P., F.R.C.S., F.C.O.G.

(Abstracted from the *Practitioner*, September 1933, Vol. CXXXI, p. 247)

THE EFFECT OF BIRTH CONTROL ON THE GENERAL HEALTH

For the moment I shall confine myself to the consideration of birth control as a general principle; particular contraceptive devices and methods will be considered later on. Does birth control injuriously affect the health of individuals or communities? How

are we to approach this problem? Precise statistical data are not available, nor, in a human population, are they ever likely to be. We have to rely on general impressions formed from the routine of common experience. The possibility that such a radical interference with the normal results of sex union may have disturbing effects cannot be denied. But I know of no reliable evidence in support of such a contention. It may be affirmed with confidence that in this and many other civilized countries 67-70 per cent of the married people have now adopted contraceptive devices of one kind or another, and any injurious effects would have been noted and named years ago. But search a modern textbook of medicine or the medical journals and you will find nothing.

Dr. C. V. Drysdale in a very able paper dealing with this aspect of the subject (see Report of the Sexual Reform Congress, London, 1929, p. 160) points out that if contraception, which may be regarded as perhaps the greatest of all modern changes in the habits of the people, has any serious physiological effect, it ought to be manifested by a diminution of vitality and longevity which would be revealed by an increased death-rate. On the contrary, as anyone may see who reads the Registrar-General's annual reports, there is no escape from the fact that as birth-rates have fallen, death-rates have fallen also and longevity has risen; and that these advantages have not been experienced to anything like the same extent in countries which have maintained high birth-rates. This certainly does not support the physiological injuriousness of contraception.

Perhaps more conclusive is the evidence given by the incidence of the death-rates at various ages. Dr. Drysdale presents a diagram which shows the ratio of the death-rates, at varying ages for men and women respectively, in the years 1920-21 to those of 1910-12. The figures show that from 16 to 25 years of age, at which latter age parenthood usually begins, the death-rate did not show much change, but from this age onwards there was a decided reduction of the mortality both for men and women amounting to 20 per cent for men and 21 per cent for women between the ages of 45 and 50 (about the end of the fertile age for women), after which the improvement lessened at greater ages. An improvement of 20 per cent in the mortality figure after an interval of ten years is remarkable and although preventive medicine and hygiene have made great progress in this time, it does, at all events, suggest that birth control has done no harm.

PSYCHOLOGICAL EFFECTS

The only psychological ill-effects I have noticed have been sometimes when people have had a failure with their contraceptive methods and have lost confidence in them, all sorts of disturbances in sex relations may then arise; and in people of a certain temperament a definite anxiety state may develop. The following case is an example:—

The wife of a medical man, after having three children, had a series of obstetrical disasters (two very premature labours and a complicated abortion followed by severe septic thrombo-phlebitis) in consequence of which further pregnancies were undesirable. Contraception was practised for a time successfully, but a pregnancy occurred which was terminated artificially and was followed by a severe form of septic infection. Confidence in contraceptives was lost and another pregnancy was dreaded. Sexual continence was for a time practised and then was succeeded by unsatisfactory sex-relations which revealed partial impotence on the part of the husband. Both partners were of a highly strung temperament and the husband became definitely neurasthenic; his work suffered, a long holiday did no good, and he was about, perforce to retire from practice. When his wife consulted me I at once proposed she should be sterilized. This having been effected, the whole situation underwent an immediate change, and harmony and successful work reigned once more.

DOES CONTRACEPTIVE PRACTICE DIMINISH THE NATURAL FERTILITY OF A WOMAN?

The belief still lingers that the prolonged use of contraceptives quite apart from the methods used, may have the unwished-for effect of diminishing or destroying the fertility of a woman, so that when a pregnancy is desired it may not occur or may occur only after a long delay. So far as I am aware no physiological theory which might explain this belief has ever been put forward; nor do I know of any experimental work, or of any controlled clinical observations which might support it. I believe it is often used as a bogey by persons prejudiced against contraceptive practice. It often exists as a vague fear on the part of the couple who, having used contraceptives, find that pregnancy does not quickly follow their disuse. The following example illustrates the sort of case in which this erroneous belief may arise:—

A young couple who for the first two years of marriage had used contraceptives consulted me because a wished-for pregnancy had not occurred although they had given up using contraceptives for six months. They were both distressed because they had been told, and believed, that the contraceptives had probably resulted in a prolonged or permanent state of infertility. I found the wife was the subject of mild hypothyroidism, and reassured her that her infertility was probably due to this and could probably be corrected by treatment. She was given thyroid gland and a diet low in calories but high in protein, and three months later reported herself pregnant.

ON THE UNWISDOM OF USING CONTRACEPTIVES BEFORE THE FERTILITY OF A UNION IS PROVEN

When a newly married couple consult me about contraception I advise them to let nature take her course to begin with and, unless there are good reasons to the contrary, to postpone the use of contraceptives until after the birth of the first child. The reason for this advice is that the fertility of any union may be much below the average, and that the practice of contraception may in consequence be not only unnecessary but positively disadvantageous, for it may have the unexpected and unfortunate effect of reducing the number of children below that which is desired. Without entering into discussion of that little understood subject of the variation of fertility (I exclude, of course, cases in which physiological or anatomical defect is demonstrable), I will merely state that cases are not uncommonly met with in which one or two conceptions seems to be nature's limit; and that cases occur in which the fertility of a union seems to endure only for a limited number of years, the fertile years being commonly the earlier years of marriage. Cases of 'one-child sterility' (better named 'one-child fertility') are not infrequent, in which the fullest investigation fails to reveal a cause for the limitation of fertility and the most careful treatment fails to correct it. Many cases of this sort are explicable only on the assumption that the fertility of the wife, or the combined fertility of wife and husband, is inherently limited. It is obvious that if, in such low fertility states, conception is prevented during the early years of marriage, absolute or relative childlessness may result. For these reasons it is wise for couples not to prevent conception until fertility has been proven. It is in these cases, also, that contraceptive practice may be unjustly blamed for destroying a woman's natural fertility.

ON INJURIOUS EFFECTS WHICH MAY ARISE FROM THE USE OF PARTICULAR CONTRACEPTIVE DEVICES

So far I have dealt only with the general principle of contraception and have not considered the particular devices which may be used to attain that end. The two ideals which should be aimed at are: (1) absolute reliability, and (2) absolute harmlessness. The former we know has not yet been attained; for the best statistics reveal that 3 per cent of intelligent people

who use contraception fail to achieve consistent protection whatever method be used.

As regards the attainment of harmlessness there can be no doubt that some devices are safe and incapable of causing any pathological condition of the female generative tract, and that some are highly dangerous. The various devices may be considered in two groups: (1) chemical; (2) mechanical.

The *chemical spermicide* most commonly used is quinine, and for many years quinine in the form of a soluble vaginal pessary, or of a jelly, has been popular. Quinine sometimes acts as an irritant to the vagina, and I have seen cases of mild vaginitis which I ascribed to this cause, chiefly because it quickly subsided when the use of quinine was discontinued. Compared with the wide use of this spermicide the proportion of cases in which it acts as an irritant must be very small indeed. One can only assume that some women have an idiosyncrasy in this respect. An important practical point is that the pessaries ought to be very carefully made in order to ensure that the quinine is equally distributed among them. This can be achieved if the work is done according to the prescription by a reliable dispenser. But most are manufactured in bulk and it has been found that sometimes the distribution of the quinine is most uneven, some pessaries containing hardly any and some a great excess.

A belief appears to be widely held that quinine if used over a long period of time may impair the inborn fertility of a woman. Experimental work has been recently undertaken in which quinine, chinosol and other spermicides were injected into the vaginas of dogs, rabbits and other animals over varying periods of time, and pathological changes in the endometrium sought for. The results were negative, no evidence of pathological effects being found. While not denying the possibility of temporary or permanent quinine sterilization—as it may be called—I have never come across any reliable clinical evidence of its existence. On the other hand, in common with many other medical persons, I have observed numerous patients who after using quinine for many years have found their fertility undiminished when a pregnancy was desired.

Mechanical devices.—It is difficult to see what possible harm can be done by the vaginal occlusive pessary which is introduced and removed by the woman herself, according to requirements. On the other hand, the rubber cap which is fitted over the cervix and left there for a period of time should not be recommended, for it prevents drainage from the cervix and may lead to chronic cervicitis, when added dangers may arise. The devices calling for most serious criticism are the cervical stem and the intra-uterine ring (Gräfenberg's ring).

Cervical stems, fortunately, are nowadays scarcely ever used in this or in any other country. They consist of hollow pins, of gold, silver or other uncorrodible metal, with a button-like lower end to fit over the external os, and some sort of intra-uterine self-retaining device, usually a pair of divergent arms which are held together during the process of introduction and then spring apart. The apparatus is presumably introduced by a doctor and is left in position for some months. It is difficult to believe that such a device can be introduced by anyone but a dangerous crank. It establishes communication between the bacterial flora of the vagina and the uterine cavity, and dams drainage. Pregnancy may take place in spite of it and abortion follows. Numerous cases of severe infection have accompanied its use, with pyosalpinx and even fatal peritonitis. The device is mentioned here only to be utterly condemned.

Gräfenberg's ring is a device which is entirely intra-uterine and not vagino-uterine, as is the cervical stem. The ring is made of a closely coiled spiral of fine silver wire and its pliability allows it to be passed through the cervical canal into the uterine cavity where it regains its circular form. As it is separated from the vagina by the whole length of the cervical canal, the

ring does not favour the passage of bacteria from the vagina into the uterine cavity, as does the cervical stem device. It is allowed to remain in the uterus for a year and is then removed and may be replaced by a fresh one.

Gräfenberg's ring has gained very few adherents among gynaecologists in this country, though it appears to be used extensively in certain continental countries. The objections commonly urged against it are: (1) It is not a reliable contraceptive; (2) it is liable to be expelled from the uterus without the woman being aware of the loss; (3) it may cause uterine sepsis. I cannot speak of its use from personal experience, as I have always had a prejudice against it, and have been persuaded to use it on only two patients. One, who had suffered from recurrent toxæmia of pregnancy, returned to me, six months after the ring had been inserted, in the second month of pregnancy. A radiogram showed that the ring was no longer in the uterus, but the patient had not noticed its exit.

Gräfenberg's ring is much used, in suitable cases, by Dr. Norman Haire, who is justly regarded as one of the most experienced contraceptive experts. He points out, in the proceedings of the Seventh International Birth Control Conference of 1930, that due precautions must accompany its use. It is, for example, necessary that the patient should be examined carefully beforehand by a competent gynaecologist, and that she should report at once to him any symptoms arising while the ring is in position. If the patient has an infected cervix, or any other form of genital infection, the ring is dangerous and on no account should be inserted until the infection is cured. If the patient acquires gonorrhœa or any other infection while the ring is in place it can cause an aggravation and spread of the infection and should be at once removed. Haire admits that in exactly 13 per cent of his cases the ring was expelled; but when subsequently a ring of a different size or elasticity was inserted it stayed in. He also points out that if a patient becomes pregnant in spite of the ring an abortion does not always follow; he has confined two patients of a baby *plus* a ring, and both the pregnancies and labours were normal and the children healthy and undamaged. With due precautions he considers the ring to be a harmless method of contraception.

On the other hand, at this same Conference, those who were against Gräfenberg's ring appeared greatly to outnumber those who were for it. Dr. Leunbach, of Copenhagen, on the basis of 176 cases was decidedly of the opinion that the ring fails in the two essentials of harmlessness and reliability. In 21 cases he had to remove the ring because of uterine bleeding between the menstrual periods, or menorrhagia. Four patients in whom the ring came out unnoticed became pregnant. Pregnancy not seldom occurred with the ring in place, and if abortion ensued he found that the presence of the ring increased the risk of complications. In three cases there occurred acute pelvic inflammation, salpingitis or parametritis. Dr. Frey, of Zurich, a very able gynaecologist whom I have had the pleasure of seeing at work in the University Women's Hospital in that city, was very strong in his condemnation of all intra-uterine devices. He did not know, he said, who were most to be pitied, those who recommended and inserted them or those women who were fitted with them. He told the Conference that the Medical Society of the Canton of Zurich had taken a definite stand and had suggested that they should no longer be used, and that the Swiss Government had forbidden their sale. It is true he was not able to report any fatal cases from the use of the Gräfenberg ring, but only two 'complicated cases'. He reported three fatal cases from the use of a cervical stem. But he considered that the difference between the ring and the stem was only one of degree.

CONCLUSION

I would sum up my views as follows: (1) Contraception, as a principle, on the evidence available,

cannot be said to exert any injurious physiological or psychological effects. (2) Vaginal occlusive pessaries if used according to the ordinary common sense rules of vaginal cleanliness can do no harm. (3) There is no reliable evidence that quinine preparations used in the vagina as a spermicide can do any harm, or can diminish or destroy a woman's inborn fertility. (4) Gräfenberg's ring should be recommended and used only by competent gynecologists who are experienced in the method and who are thoroughly aware of the precautions which should accompany its use. (5) It should be made a criminal offence to sell or use for contraceptive purposes a cervical stem.

Leprosy in the Philippines

By M. E. HIGGINS

(From the *United States Nav. Med. Bull.*, Vol. XXXI, October 1933, p. 363)

LEPROSY is one of the outstanding health problems of the Philippines. The Culion colony with its 5,700 patients is probably the largest leprosarium in the world. There are approximately 2,000 lepers segregated at other places, so that the total number under observation is about 8,000. Excellent facilities are afforded for study and research and Philippine workers have made and are making valuable contributions to our knowledge of the disease. A more recent bibliography compiled by the Director of the Philippine Health Service cites 177 references in the literature from Philippine sources.

The writer has recently visited the leprosaria at Culion, Iloilo, Cebu, and Zamboanga. At all of these stations every opportunity was afforded him to observe the medical and administrative procedures employed in the management of the disease.

Culion is an island with an area of nearly 200 square miles lying 250 miles south of Manila. The Culion Leper Colony was established in 1906 as the principal centre for the segregation and treatment of leprosy. It is also the chief centre for bacteriological and pathological research and for the manufacture of antileprosy drugs.

The colony has a 500-bed hospital, dormitories for 2,000 patients, clinic buildings, and laboratories. These buildings are of concrete construction. In other respects the colony resembles the ordinary Philippine town, most of the houses being bamboo and nipa construction of the type commonly seen throughout the islands. As far as practicable the patients are encouraged to carry on their usual vocations; some manage retail shops; others are engaged in fishing; a number cultivate small farms on the outskirts of the town and sell their products in the colony.

There are about 1,000 nonlepers on the island—physicians, nurses and administrative assistants who live in a special reservation separated from the main colony.

A portion of the island has been set aside for the development of an agricultural community to be operated by paroled lepers who can no longer be cared for in the colony proper, but who do not, for various reasons, wish to return to their former homes. This 'negative varrio' is 16 kilometers from the main colony and is reached by an excellent road constructed almost entirely by the patients themselves.

The Eversley Childs Treatment Station near Cebu is the second most important station in the Philippines. It was designed to accommodate 500 patients and built under the auspices of the Leonard Wood Memorial. It consists of a hospital, dormitories, clubhouse, administrative buildings, and a chapel—all of concrete construction. The ample grounds have been attractively laid out and planted with a variety of palms and flowers so that the general effect is extremely pleasing.

The Western Visayas Treatment Station is located on the island of Panay near Iloilo. It accommodates

275 patients. All of the buildings at this station are of temporary or light construction.

The central station for the island of Mindanao is at Zamboanga. A new 50-bed frame hospital has just been completed; it replaces a number of small structures of temporary construction.

In addition to the above stations the Bihol Treatment Station in southern Luzon and the San Lazaro Hospital at Manila accommodate about 800 cases. There are also a number of substations throughout the Philippines where cases can be held temporarily pending transfer to one of the central stations. In the larger cities skin clinics have been established which are proving to be a valuable factor in the detection of incipient cases.

The Leonard Wood Memorial is a \$2,000,000 foundation established in memory of General Wood who was much interested in the control of leprosy. It works in close co-operation with the Government Health Service and is especially interested in research work bearing on the ætiology, pathology, and bacteriology of leprosy. Its chief activities are at Culion and Cebu. At the former place a thoroughly equipped laboratory and experimental wards are nearing completion. At the Eversley Childs Station at Cebu which was built by the foundation at a cost of \$200,000, it is proposed to devote particular attention to the question of ætiology.

Dr. H. W. Wade, who was for many years the director of the pathological section at Culion, is the field director of the memorial with headquarters at Culion.

Observations in the Philippines bear out the generally accepted belief that leprosy is a familial disease and that infection occurs almost exclusively during infancy and early childhood. Adult infection seems to be extremely rare. During the 25 years that Culion has been in operation there has not been a single case of the disease developing among the physicians, nurses, and attendants. One Sister of Charity who has been in the colony since its beginning and in the most direct contact with active cases has remained free from infection.

It is estimated that 95 per cent of all cases occur among the poorer classes. Bad hygienic surroundings and defective diet undoubtedly play a prominent rôle in determining susceptibility to the disease.

The ethyl esters of the oil of the *Hydnocarpus wightiana* are now generally used throughout the Philippines in the treatment of leprosy. The crude oil is imported from India and refined in the chemical laboratories of the Culion colony. One half of 1 per cent metallic iodine is added to the esters in order to lessen irritation. The drug is injected either intradermally or intramuscularly. Usually a combination of these methods is employed. The total dose is 5 cubic centimeters. When given intradermally not more than 0.1 cubic centimeter is injected at any one point. Injections are made two or three times weekly. The site of the intradermal injections is marked by a characteristic bluish discoloration which may last for several months. The general belief in the Philippines is that this treatment does not cure the disease. 'Once a leper always a leper' is an opinion frequently expressed by many experienced workers. There is no doubt however that acid-fast organisms disappear from nasal and dermal lesions and that the progress of tubercular lesions is arrested. These are the 'negative' or 'arrested' cases that are paroled. It has been found that a considerable number of these paroled cases again become active.

Apparently the question of diet as a therapeutic measure has not been given any special consideration, chief reliance having been placed upon segregation and the administration of chaulmoogra oil. It is generally recognized that the diet of the poorer classes is not well balanced, being deficient especially in proteins and fats. Vitamin deficiency also occurs. Beriberi is not infrequently a concomitant disorder. Since vitamin B is often lacking it is not unreasonable to suppose that other important factors are inadequate. Certain observers believe that a scientifically-controlled diet

and hygienic management along the lines now employed in the treatment of tuberculosis may have a profound effect upon the progress of early leprosy. Apart from the similarity of the causative agents the parallelism existing between tuberculosis and leprosy is striking.

Segregation and chaulmoogra oil have apparently failed to make any marked reduction in the number of cases of leprosy occurring annually in the Philippines. Under present conditions the eradication of the disease will have to wait upon such slow factors as rising cultural and economic levels. Additional measures that have been recommended include the removal of the children of leprosy parents at birth, the sterilization of the male lepers, and birth control. The application of all these procedures is attended by manifest difficulties. The education of the masses regarding early diagnosis and treatment has yielded valuable results. At all of the stations more and more people are voluntarily applying for examination and treatment. One hopeful feature in the control of the malady is that it is no longer regarded with the exaggerated horror which has so long characterized the public conception of the disease.

The expense incident to maintaining 8,000 lepers in segregation places a great strain on the budget of the Philippine Health Service. It is estimated the Government has expended \$11,000,000 on the control of leprosy since the establishment of the Culion colony in 1906.

At the present time nearly one-third of the health appropriations is devoted to leprosy. Many physicians feel that this amount is inordinate and that some of the funds now devoted to leprosy should be expended in the fight against tuberculosis, a disease in which the mortality and morbidity are vastly greater. The number of lepers in segregation is constantly increasing and practically all the stations are at their capacity level. Unless some means can be found to lessen this growing financial burden, the situation will soon become a serious problem.

SUMMARY

- (1) There are at present about 8,000 lepers in segregation in the Philippines.
- (2) The iodized esters of the oil of the *Hydnocarpus wightiana* are used in the treatment of the disease.
- (3) The consensus of opinion is that permanent cure is not obtained.
- (4) In early cases marked improvement occurs in tubercular lesions; acid-fast organisms disappear from nasal and dermal lesions.
- (5) Adult infection is extremely rare, the belief being that infection takes place during infancy and childhood.
- (6) The control of leprosy absorbs one-third of the funds available for health work in the Philippines.

Reviews

HEREDITY AND THE SOCIAL PROBLEM GROUP.—

By E. J. Liddbetter. Volume I. Edward Arnold and Co., London. 1933. Pp. 160. Illustrated

The study of poverty and pauperism has for long been a favourite one with statesmen, public-health workers, and social reformers. Indeed it is hardly an exaggeration to say that we owe the real beginnings of public health in England to the rapid growth of pauperism in the early years of the industrial revolution. Sir Edwin Chadwick and John Wesley—one the Secretary of the Poor Law Board of England, the other a clergyman discontented with the *laissez-faire* attitude of the educated and governing classes of England towards the destitution of the lower classes in the early years of the 19th century, set aflame the scientific and humanitarian consideration of poverty, vice, misery, and disease. By gradual and sound legislation on the one hand and the development of a spirit of responsibility, toleration, and consideration on the other, the beginnings of public health in England were laid in 1840.

The study of heredity is an old one and the fact that like tends to beget like needed little scientific observation or proof. Mendelism, however, and the minuter study of cellular genetics have shed new light on the actual mechanism of plant and animal inheritance. Then arose the question, could these facts be used in the improvement of the human race, to favour the development of desirable characteristics, and to discourage the production and perpetuation of undesirable traits? Animal herds had for long been improved by selective breeding.

Eugenics, as applied to the human race, is striving towards becoming a science and a moving force. Sir Francis Galton, who founded the Eugenics Society, cited his own family as one which had produced many brilliant and distinguished men and women by a judicious blend of three intellectual families, the Wedgewoods, the Darwins, and the Galtons. Others like Dean Inge have given similar instances. On the other hand many pedigrees of degenerate families (the Jukes and Kallikaks, for example) have been studied with the object of showing that laziness, criminality, and

viciousness appear in generation after generation with such regularity and insistence as to suggest hereditary significance. Whether heredity or environment determines human characteristics is still a favourite battle ground. Both undoubtedly are of importance, sometimes one and sometimes the other playing the major part. Whether mental qualities are of the same *genre* and are transmitted by recessive and dominant genes in the same way as eye-colour, hæmophilia, left-handedness, etc., is still a very moot question. Galton's own studies of 'regression' suggested that nature works towards an average both from above and below. On this basis genius and high intellect on the one hand will always be rare, but so on the other hand will gross viciousness and desperate criminality; and just as the progeny of very clever people are more likely than not to be more ordinary than their parents, so there may be no necessity to postulate a criminal progeny to vicious or criminal parents.

Mr. Liddbetter has been connected with the administration of the Poor Law in England for many years and the present volume is a close study and collection of 26 pedigrees of the members of families who exhibited various disabilities, bodily, mental and moral, which resulted in pauperism, insanity, vice and criminality. The pedigrees consisting of histories and characteristics are given in great detail in diagrammatic and narrative form. The exact value of the collection will be argued. Mr. Liddbetter draws no conclusion as far as one can see. Major Leonard Darwin in an interesting preface suggests that the materials collected by Mr. Liddbetter will be of enormous value to future students of social problems. He concludes 'as long as this wretched stream of social inadequacy continues to flow in the appalling way indicated by these pedigrees, and whatever be the part played by nature and nurture, the nation would gain greatly if all those definitely inferior to the bulk of their fellow citizens were to have no children or but small families'. Most thoughtful people might agree to this at first sight but on more careful thought will conclude that the statement is too relative to mean

much. Several states have tackled the problem, but as yet no solution is evident. Those interested in the future of eugenics will like to have the volume for reference.

A. D. S.

A SIXTH VENEREAL DISEASE.—By H. S. Stannus, M.D., Ph.D. (Lond.), F.R.C.P. (Lond.), M.R.C.S. (Eng.), D.T.M. & H. (Cantab.). 1933. Baillière, Tindall and Cox, London. Pp. xli plus 270, 9 plates. Price, 12s. 6d.

UNDER the title 'a sixth venereal disease' are included two main venereal diseases, climatic bubo, a disease of the tropics, and lymphogranuloma inguinale, a condition recognized in Europe and America, together with a host of other clinical conditions, such as esthiomene, chronic ulcer, and elephantiasis of the genito-anal region, inflammatory stricture of the rectum, and several allied conditions. The diversity of opinion that has been held in the past, in regard to the aetiology of these several affections, led to the coining of several names to describe different clinical entities in different parts of the world. It was not till it was established that these several conditions yield the same specific filtrable ultra-microscopic virus, and that the histopathological picture, whatever the lesion, whether in man or experimental animals, is practically the same and that variations are variations not in kind but in degree according to the activity of the virus and the stage in the process, that the identity of these several conditions was obtained. The author, who as a sectional editor of the *Tropical Diseases Bulletin* was particularly fitted by his extensive knowledge of the subject, has given, in this monograph, a detailed and critical review of the whole subject in all its aspects and with a very complete bibliography which contains 933 references. In using the designation 'sixth venereal disease', no suggestion is made that such a term should come into common usage, but it serves the very useful purpose, however, of bringing together under one heading several conditions which were at one time held to be several different entities. The author suggests the term 'poradenitis' as a general term which can be qualified to describe different clinical conditions. The other five venereal diseases are syphilis, gonorrhœa, chancre, genital infection by Vincent's organism (the 'fourth venereal disease' of some American writers) and granuloma venereum (ulcerating granuloma of the pudenda).

This is an excellent book; it contains reviews of all published cases of this very interesting disease and a general summary of the history, the clinical manifestation and a critical digest of all the research work that has been done on this condition. It is a book that will appeal to those engaged on research work on filtrable viruses, to the venereologist and to the practitioner of medicine who will find much in it that will help him in the proper diagnosis of many venereal conditions that have been labelled so far by different names.

C. L. P.

HISTOLOGY.—By S. Ramon-Cajal, M.D., F.R.S., LL.D. Revised by J. F. Tello-Munoz, M.D. Authorized translation from the tenth Spanish Edition by M. Fernan-Nunez, M.D. 1933. Baillière, Tindall and Cox, London. Pp. xiv plus 738, with 535 figures. Price, 40s.

THIS book has been translated by a Spanish medical man practising in America. In his preface the translator explains that it is a student's textbook of elementary histology, and he goes on to describe briefly the extensive histological knowledge that the Spanish medical student has to absorb. It is certainly not elementary according to the usual English standards.

The book is said to be a literal translation as far as possible, which makes the nomenclature and phraseology unusual from the English point of view, nevertheless it is remarkably clear and there

is no difficulty in following the descriptions. This is surprising when it is noted that strictly American spelling has been added to the literal Spanish translation.

The first seven chapters are devoted to considerations of cells in general, dealing with structure, physiology, chemistry, division and evolution. These are extremely interesting and might be read with profit by anyone interested as they give an unusual perspective of the subject. This latter remark can be taken to apply to the whole book for the descriptions throughout give quite a new conception to the histology of the various organs, from that usually gained from English or American books, but of course the underlying facts are unaltered. Perusal of this book therefore has the effect of considerably broadening one's vision of histology.

Another unusual feature is the large number of original illustrations. These are beautifully executed, but so much detail is displayed that one feels that most of the figures are not actual drawings, but probably composite semi-diagrammatic sketches, this impression is strengthened by the fact that nowhere is the magnification given. Nevertheless they are of very great instructive value.

It is not a book that can be recommended to students who are being instructed on the usual lines of British medical schools, and whose primary object is to pass the examiners, but it might be read with profit as an adjunct to their regular teaching.

P. A. M.

HISTOPATHOLOGY OF THE PERIPHERAL AND CENTRAL NERVOUS SYSTEM.—By G. B. Hassin, M.D., 1933. Baillière, Tindall and Cox, London. Pp. xiv plus 491, figures 227. Price, 30s.

THE inadequacy of the space usually allotted to the study of neuropathology in ordinary clinical manuals on neuro-psychiatry and the fact that neuropathology is essential to the proper understanding of clinical phenomena led the author to prepare this volume. Diseases of the peripheral nerves, spinal cord and brain are described individually from a histopathologic angle only, and in order to keep the book as concise as possible, reference to the clinical aspects of the subject have been made very brief.

The book is divided into four parts dealing with diseases of the peripheral nerves, the spinal cord, the brain and a last part containing a very useful summary of staining methods which have been found useful in histopathological work of the central nervous system. At the end of each chapter is given a very useful bibliography. Altogether this book is well conceived and well written, has excellent illustrations, and should prove of value to advanced students, particularly those engaged in the study of neuro-psychiatry.

C. L. P.

A POCKET GUIDE TO MEDICAL LIFE ASSURANCE.—By J. J. Cursetji, M.D., L.R.C.P., L.R.C.S., L.M. & S., F.C.P.S. (Bom.), J.P. Third Edition. 1932. Printed at the Union Press, Bombay. Pp. 274. Price, Rs. 6-8, cloth binding and Rs. 5-8, bound in thick cardboard cover

THIS small book is written by a medical man who has had a long experience of life assurance in India, and in consequence it is full of valuable advice, especially to a practitioner who is called upon to make examinations at rare intervals, but it might also be read with profit by experienced medical examiners and should certainly be kept where it may be referred to readily.

Naturally it will be of most use in India and here it will be found of special assistance because it gives valuable comparative information about the numerous different races and religious sects in the country, whose different customs and modes of life have a powerful influence on their health. At the same time this book will be of use in any part of the English-

speaking world as it is full of well chosen quotations and examples drawn from the experiences of the principal British and American officers.

BLOOD PRESSURE IN LIFE ASSURANCE PRACTICE.

—By J. J. Cursetji, M.D., L.R.C.S., L.R.C.P., L.M. & S., F.C.P.S. (Bom.), J.P. 1931. Printed at the Union Press, Bombay. Pp. 16

THIS pamphlet of sixteen pages begins with a clear and well illustrated description of how the blood pressures (systolic and diastolic) should be taken. It is so clear that any medical man might purchase a sphygmomanometer and teach himself how to perform the operation, without any personal instruction.

This is followed by a general outline of the significance of blood pressure readings in health and disease, and at the end there are two tables giving comparative figures for Americans and Canadians and a third table compiled from observations made at the Oriental Life Assurance Company, Bombay. It is an eminently practical little publication.

AIDS TO SANITARY SCIENCE AND LAW.—By C. F.

White, M.B., Ch.B., D.P.H., D.T.M. Second Edition. 1934. Baillière, Tindall and Cox, London. Pp. vii plus 321. Price, 4s. 6d.

SANITARY science and sanitary law are undoubtedly extremely interesting subjects, but attempts to compress them into a small compass invariably seem to produce uninteresting and rather repellent skeletons that miss all the attractiveness of the living agencies. The present book is hardly an exception to the rule. A great deal of matter has been collected in various chapters, but it is all unconnected and the style resembles a collection of notes and jottings. This is almost unavoidable in a book of this nature.

To judge correctness of information, one turns naturally to the sections on tropical diseases. The information is meagre and often at fault. It is rather surprising that cholera is not mentioned here. It is only mentioned casually under the Port Sanitary Regulations of 1933. It is surely one of the most important 'tropical' diseases from the temperate climate point of view.

Xenopsylla astia is not mentioned under plague. The causal organism of yellow fever is stated to be *Leptospira icteroides*. This view is not held by any one now. Ticks, under relapsing fever, are spelled 'tics'. Under malaria, quinine is stated to be a prophylactic, if given at the right time—no mention is made of recent observations of James, Swellengrebel and others.

Sanitary law is summarized, but no discussion of administration is given.

The book is not likely to be of any great assistance to public-health students in India or other tropical countries.

ACTINOTHERAPY TECHNIQUE: AN OUTLINE OF INDICATIONS AND METHODS FOR THE USE OF MODERN LIGHT THERAPY.

With a Foreword by Sir Henry Gauvain, M.D., M.Ch., F.R.C.S. 1933. The Solflux Publishing Company. Pp. 184. Price, 6s., postage 4d.

MANY books have been written on this subject but the book under review is in some ways exceptional. There are a few introductory chapters on such subjects as physical data, physiological effects of different rays, dosage, and heat rays; the rest of the book is then divided into chapters on the treatment in different morbid conditions.

Every statement has the full authority of an article in some well-known medical journal. The method of administration of the rays, usually ultra-violet, sometimes infra-red, is described, the suitable dose suggested, the instrument to be used recommended, and any special dangers that are to be avoided are pointed out.

It should prove a useful book to the general practitioner who wishes to use actinotherapeutic methods.

It is, however, an uncritical book and unsuitable for the younger students of medicine. If the decision to use actinotherapy is arrived at independently, the book will be a useful guide, and in this capacity we can confidently recommend it.

AN OUTLINE OF PRACTICAL OBSTETRICS FOR NURSES.—By R. S. S. Statham, O.B.E., M.D.,

Ch.M., F.C.O.G. 1933. John Wright and Sons Ltd., Bristol. Pp. 139. Price, 2s. 6d.

THE author's avowed intention was to write a small book, 'solely for the purpose of revision', for the Central Midwives Board Examination. Its convenient size is designed to ensure that it will be carried about with the nurse and help to pass profitably some of the long hours of waiting when she is conducting domiciliary midwifery cases. For nurses who appreciate and can learn from 'cram' books it will prove useful, though the lack of diagrams for reference when reading the first two chapters on the anatomy of the female pelvis and genital organs, and on the ovum and foetus will be rather a serious handicap to any one not absolutely familiar with the pictures, models and specimens of the class room.

Facts are cut down to a minimum and discussion of procedure is incompatible with the size of the book. There is danger in this and the nurse may rest content with the statement that it is advisable that one antenatal examination by the doctor should take place and that at the 32nd week of pregnancy, rather a late date at which to begin preventive measures. The nurse is more capable of detecting abnormalities of proportion or presentation than of assessing the woman's fitness for pregnancy, and the later examination rather than the earlier can better be left to her when only one is to be undertaken.

The nurse has responsible duties with regard to the establishment and management of breast feeding and while this is not stressed in the present Central Midwives Board syllabus, perhaps something might be added about it at the expense of manipulations and the administration of anaesthetics, such as nitrous oxide, which are only within the province of the doctor.

J. M. O.

Abstracts from Reports

ABSTRACTED FROM THE ROCKEFELLER FOUNDATION, ANNUAL REPORT FOR THE YEAR 1932

Part II

In our last number we gave an abstract of the portion of this report dealing with yellow fever research, and although this is a comparatively new addition to the numerous activities of the Rockefeller Foundation all its other branches of inquiry are still being conducted as actively as ever and a brief résumé of them is given below.

MALARIA

The malaria problem

The general principles of malaria propagation have been known for a third of a century; yet malaria prophylaxis is still a perplexing problem, and malaria remains the king of tropical diseases.

Malaria control through eradication of the mosquito vector is comparatively simple if expense need not be considered. But to control this disease when expenditures must be kept within the average public health budget is a far more difficult task. The problem is to bring control work within the economic means of the community.

To determine the logical procedure necessary in combating malaria in any particular area a careful study must be made. An important part of all malaria control work is malariometry. By noting parasite, spleen, sporozoite, and mosquito indexes during and after the administration of prophylactic measures, it is possible to make a fair estimate of the return that is being obtained for antimalarial expenditures.

If patients could be segregated it would be possible to apply the slogan 'Do not infect the mosquito and the mosquito won't infect you'. Unfortunately such segregation is usually impossible.

Generally speaking, the drugs that are specific for malaria are expensive and are not easily administered on a large scale. Quinine is extensively used, but it has marked limitations. It is effective against symptoms; it has saved innumerable lives; but it is not a preventive of the disease. In areas where attempts have been made to control malaria by means of quinine, better food, better housing, and better hospitals, the effect on the prevalence of the disease has been practically nil. On the other hand, wherever efforts have been directed against the mosquito vector, malaria has decreased and its spread has been controlled.

Some results can be obtained by killing adult mosquitoes through such methods as swatting, catching, spraying, fumigating, trapping, the use of poison baits, and the encouragement of natural enemies. However, not a great deal can be expected from such methods, because they require the systematic and continuous co-operation of the individuals of a community, and this, except under army conditions, is rarely possible of achievement.

Other methods aim at preventing the mosquito from biting. These include screening, special clothing, bed nets, chemical or mechanical repellents, removal of houses from malarious districts, provision of animal barriers, and best of all, the killing of mosquito larvæ.

The destruction of larvæ can be accomplished in a number of ways. One of them consists in oiling the surface water in which mosquitoes breed. But such oiling can serve only as a temporary measure. Continued for many years, it is frequently found to be more expensive than permanent control measures, such as draining or filling. Larvæ can also be killed by dusting Paris green on the water in which they are found. This measure is effective even if the Paris green is extensively diluted with road dust or some similar substance. There is no evidence of the danger of Paris green, when used in this way, to life other than that of mosquito larvæ. It has never poisoned human beings, live-stock, or even fish in the waters in which it has been used. It has no ill effects on rice or other crops. On the other hand, it does not kill mosquito eggs or pupæ. It is also not so easily visible as oil, and is therefore more difficult to control by means of inspection.

Encouragement of the multiplication of the natural enemies of the mosquito, especially small larva-eating fish, is a simple and effective way of controlling mosquito production. The top minnow is particularly useful for this purpose, but in few places in the world have fish alone been able to control malaria. They are of use chiefly as an adjunct.

The larvæ of the yellow fever mosquito can be trapped, because the mosquito which carries this disease breeds chiefly in artificial water containers found around houses; but trapping of the larvæ of the malaria-carrying mosquito would not be feasible, since this mosquito will breed wherever suitable water or moisture can be found.

The more radical and most successful methods of combating the malaria mosquito consist in destroying its breeding places by means of drainage, clearing, cleaning, channelling, emptying, filling, flushing, and drying, impounding, salting, or altering the composition of the water; and above all, by the orderly progress of agricultural cultivation, which tends to do away with

swamps and breeding areas. The economic improvement represented by progressive cultivation supplemented by the passage of the necessary sanitary laws, which usually follows enlightened public interest, is in the long run the most effective means of abolishing malaria.

In no single region is it necessary or feasible to apply all the antimalaria measures known. Each region presents a special problem. For this reason, as the late Sir Ronald Ross pointed out, success depends 'on the intelligence, enthusiasm, and energy of those who are responsible for sanitary affairs'.

The above passage from the report indicates the numerous aspects of the malaria problem which are receiving attention and the next twenty-five pages are devoted to accounts of these inquiries in various parts of the world. These accounts are of considerable interest but they do not readily admit of abstraction so they have had to be omitted on account of lack of space.

Hookworm disease

The following brief passage taken from the report gives an outline of the history of hookworm control from the beginning, and, as this is the basis on which the world-wide activities of the Rockefeller Foundation have been built up, it is given in full.

Early campaigns.—The work of the Rockefeller Foundation in public health had its origin in the Rockefeller Sanitary Commission for the Eradication of Hookworm Disease, which began activities on 26th October, 1909. At the start certain administrative principles were adopted which have proved to be well founded and which have been followed ever since. Work was undertaken only with state or government co-operation. Activities were carried out as far as possible through existing agencies. Each country has its own system of organized medicine, its own public press, public schools, and public health service. These four established institutions, rooted in the life and traditions of the people, are fundamental to all health education. To enlist these agencies in an undertaking is to assure permanency of work from the beginning. An outside agency can be helpful only in so far as it aids the state in organizing and bringing into activity its own forces.

The first field work of the Sanitary Commission was in the control of hookworm disease. By the time the Rockefeller Foundation was established, 14th May, 1913, the Commission had treated or caused to be treated more than 500,000 hookworm sufferers in the United States. The Foundation took over the work of the Commission and prepared to extend the hookworm campaign to other countries.

The plan adopted in 1913 was to make a survey of the geographic distribution of hookworm disease and the approximate degree of infection obtaining in infested areas; then to undertake microscopical examination of faeces and treat persons who were found to be infected; and finally to set in operation and make effective such sanitary measures as would put a stop to soil pollution. Hookworm work was rapidly extended throughout the Southern United States and then to the British colonies and to a large part of tropical Latin America. The work was most successful in bringing about cures and improving sanitation, and it also served as a foundation on which a general health service could be built up.

As hookworm control measures were extended, the need for more investigative work was felt; and this was started when Dr. S. T. Darling, Dr. M. A. Barber, and Dr. H. P. Hacker were commissioned, in 1915, to make studies in the Orient on hookworm disease. The programme of research work combined with field work thus initiated has never been abandoned. Research work, which casts light on the nature of the problem and leads to the improvement of methods, has been emphasized more and more. As a result, better work at diminishing cost can now be carried out. The opportunity for productive studies is not exhausted.

Research on the question of immunity against helminths and the effect of diet on susceptibility to in-

fection are being carried out on a large scale in the laboratory. Dogs and the dog hookworm are being used for this purpose. Another important branch of hookworm research that is receiving continued attention is the search for better drugs, and the current report records the experiences with the use of hexylresorcinol.

The common cold, undulant fever, yaws, and tuberculosis are all being investigated in one or more parts of the world and numerous miscellaneous studies of less general importance are mentioned.

Public health institutions are still being assisted in very many countries and we give below that part of the report that deals with the Foundation's work in India and Ceylon.

Owing to the economic depression, the disturbance of public order, and reduction of personnel and appropriations, public health work throughout the East has encountered a difficult situation. Notwithstanding discouraging circumstances much progress has been made. During 1932 the Rockefeller Foundation contributed to budgets for public health work under supervision of Foundation representatives in the following countries: Ceylon, India, China, Egypt, Netherlands East Indies, the Philippine Islands, and the South Pacific Islands.

During the year there was published an account of the health units which the Government of Ceylon is establishing in rural and semirural areas of the island. The organization of an official unit is described, and an account is given of its work, methods of operation, and manner of budgeting. Experience indicates that the needs of a rural area are well met by such units, and their establishment has aroused considerable interest among health workers and the general public.

In the State of Mysore in India, a Foundation representative continues to serve as a consultant to the government on health matters. A local health unit started in 1930 with assistance from the Foundation is operating under government auspices and with government funds. In 1932 the Bureau of Sanitary Engineering, which is under the direction of a Foundation representative, carried on experiments in composting night soil and refuse (*vide Indian Medical Gazette*, Feb. 1934).

Five visits were made to the State of Travancore by the Foundation representative stationed in Ceylon. At a town situated 12 miles from the capital city of Trivandrum, a health unit organized in 1931 with Foundation aid is making favourable progress under the supervision of a former Foundation fellow. A comprehensive public health programme is carried out by trained personnel. Special efforts are directed against malaria and hookworm disease. A Division of Public Education was started in 1932, towards the budget of which the Foundation make a contribution. The officer in charge is provided with cinema apparatus, a motor truck, and other material for health propaganda.

In order to test the possibility of successfully maintaining a local health unit under Indian conditions, the Foundation is co-operating with the health services of the United Provinces in the establishment of a health centre in Partabgarh, an area of 60 square miles with a population of 50,000. The health centre is organized along the lines of those in Ceylon. The work is directed by a former Foundation fellow.

We regret that it is quite impossible adequately to describe the work of this great organization in a brief abstract and we can do no more than mention the assistance that has been given to various countries in the form of building colleges for the training of medical students and nurses, the equipment of laboratories, and the granting of fellowships to enable promising students to visit other countries for the purpose of study.

The above abstract has only dealt with the work of the International Health Division of the Foundation, but in addition there are large sections devoted to Medical, Social, and National Sciences and the Humanities.

ABSTRACTED FROM THE ANNUAL RETURNS OF THE HOSPITALS AND DISPENSARIES IN BIHAR AND ORISSA FOR THE YEAR 1932

THERE was an increase of three in the number of dispensaries, eight being opened and five closed during the year.

The general health of the province appears to have been considerably better than in 1931, for the deaths from all causes except that of smallpox were distinctly lower, and in spite of the fact that this disease accounted for an increase of over 8,000 deaths the death-rate from all causes was 20.6 as against 26.6 per mille in 1931.

Four more leprosy clinics were in operation during 1932 and 2,355 more patients were treated than in 1931, indicating that more persons are being induced to attend for treatment.

It is also noted that there was a slight increase in the number attending for venereal infections in their early stages.

ABSTRACTED FROM THE ANNUAL REPORT OF THE EAST GODAVARI DISTRICT MEDICAL ASSOCIATION FOR THE YEAR 1933

WE have received a copy of the annual report of this association for the year 1933, and an account of the second anniversary general meeting.

This is a young association but it exhibits signs of robust health for already it has 157 members, fifty of whom joined this year. On account of the extent of the district the monthly meetings are held in rotation in different centres. This is a good way of giving all the members an opportunity of attending at least some of the meetings during the year.

The association combines clinical and scientific meetings with gatherings of a social nature and from the brief account of those given in the annual report they appear to have been highly successful from both points of view. The average attendance at these monthly meetings is 52 which appears to be a highly satisfactory figure to us but the secretary is not at all satisfied with this.

The annual meeting was held at Cocanada and it took the form of a business meeting, followed by a tea party. There was then a meeting, when several interesting papers were read, and a very successful function was concluded by a dinner. One hundred and one members, twelve medical men who were non-members and many lay visitors attended. Major T. S. Shastri, I.M.S., has again been elected president, and we gather from the remarks on this officer in the report that it is he who is mainly responsible for the success of this young association.

We extend our hearty congratulations to this organization and wish it continued success, for the formation of such societies, which devote the whole time at their disposal to meetings of a solely scientific and social character and ignore politics, cannot fail to be of great benefit both to the medical profession and, as a natural corollary, to the general public.

Correspondence

POST-PUERPERAL POLYNEURITIS

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR,—I have read with considerable interest the article on post-puerperal polyneuritis, by Drs. V. Isvariah and Kutumbiah of Vizagapatam, that appeared on page 13 of your January (1934) issue. The authors of this article and others have reported cases seen by them in the coastal districts of the Northern Circars of the Madras Presidency, which districts have been known for many years past as endemic areas of beri-beri.

About 15 cases of post-puerperal polyneuritis have been admitted within the last 15 months as in-patients in the Railway General Hospital at Lallaguda, a suburb of the city of Hyderabad, Deccan. Hyderabad has not been known as an endemic area of beri-beri, nor has any case of post-puerperal polyneuritis from Hyderabad been reported in the *Indian Medical Gazette*.

This disease generally commences about the second month after delivery with numbness and tingling in the lower extremities; the patients are unable to walk, the calf muscles are tender, the deep reflexes are always absent, and there is flaccidity and wasting in some cases. The sensations were affected in a few cases, but the bladder and rectum were normal, and there was no albumin in the urine. In a few cases the upper extremities were also affected. Lately, we had a fatal case of post-puerperal polyneuritis with mitral incompetence.

A point of very great interest to be noted is that not even a single woman later than six months after delivery was admitted into this hospital for polyneuritis during the period under report.

It was sometimes thought that this disease might have been caused by some medicine, such as mercury or arsenic, given by quacks during the puerperium, but a careful enquiry from the patients failed generally to elicit such a cause. This disease affected usually ill-nourished young Indian women. With nourishing diet, germinating gram, and potassium iodide these patients were cured or improved considerably within two to three months. In cases where there is definite history of syphilis, anti-syphilitic treatment has given rapid improvement.

I am grateful to Dr. B. V. Pulla Reddy, our Acting Chief Medical Officer, for permitting me to refer to the cases treated in the Railway General Hospital.—Yours, etc.

I. VENKATAPAYYA,
Sub-Assistant Surgeon.

RAILWAY GENERAL HOSPITAL, LALLAGUDA,
SECUNDERABAD, DECCAN,
9th February, 1934.

FEVERS IN PREGNANCY

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR,—It has been brought to my notice that, in my article on 'Fevers in Pregnancy' which you kindly published in the November 1933 number of your *Gazette*, in lines 8 and 9, second column, page 621, I have referred to Glucose 'D' (Sandoz). This is a mistake, in that Glucose 'D' is not a 'Sandoz' preparation. It is a product of the Glaxo Laboratories.—Yours, etc.

M. SARKAR, B.A., M.B., F.R.C.S.E.,
Second Professor of Midwifery and
Second Surgeon.

EDEN HOSPITAL, MEDICAL COLLEGE,
CALCUTTA,
6th March, 1934.

PLANOCAINE IN SPINAL ANALGESIA

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR,—In reply to Mr. Surti's letter in the February issue of the *Indian Medical Gazette*, we have to say that we have used one per cent planocaine solution for spinal analgesia for the last two years for all operations, both major and minor, with such good results that in not a single instance has there been a failure in anaesthesia. Regarding the use of percain, we plead inability to express an opinion as we have no experience of this drug. Our reluctance to use percain is the waste of time entailed in keeping the patient in the prone position for ten minutes after injection.

With planocaine the patient is ready for operation while being draped in three minutes after injection. Acute dilation of the stomach was met with in a few cases in the early days when we were using large doses of planocaine for upper abdominal work. Since the introduction of graded dosage for various levels, as detailed in our article in the *Indian Medical Gazette* of September 1933, this complication has not been met with. We should like to quote Dr. F. W. Marwin, M.D., whose article on the 'Present Status of Various Spinal Anaesthetics and their Clinical Usefulness' in the *Journal of the American Medical Association* of 4th November, 1933, which you have extracted in the *Gazette* for February 1934, page 103. He says: 'The use of spinal anaesthesia requires a precise technique for unique results. I strongly advise everyone to employ his own technique in his own clinic. Not every new method that comes along should be adopted. If an anaesthetist has good results, he should continue his technique but, on the other hand, he should not be contented to squat and ignore the newer and better preparations with the improved methods of application'.

We feel that this sums up our attitude towards the usage which we have found most satisfactory in every way.

Regarding the mention of a firm's name in relation to the drug employed (which was not criticized in Mr. Surti's communication) the usual disclaimer is appended.—Yours, etc.

J. F. ROBINSON.
T. SESHACHALAM.

MYSORE, S. INDIA,
1st March, 1934.

Service Notes

APPOINTMENTS AND TRANSFERS

IN pursuance of the provisions of sub-rule (2) of rule 26 of the Council of State Electoral Rules, the Governor-General is pleased to nominate Major-General C. A. Sprawson, C.I.E., K.H.P., being an official, to be a Member of the said Council of State.

IN pursuance of the proviso to sub-section (2) of section 3 of the Indian Medical Council Act, 1933 (XXVII of 1933), the Governor-General in Council is pleased to nominate Major-General C. A. Sprawson, C.I.E., K.H.P., Director-General, Indian Medical Service, as the President of the Medical Council of India.

Lieut.-Col. H. E. Shortt, an officer of the Medical Research Department, is appointed to officiate as Director, Central Research Institute, Kasauli, during the absence on leave of Lieut.-Col. J. Taylor, D.S.O., with effect from the date on which he assumes charge of his duties.

Lieut.-Col. B. Gale, Civil Surgeon, Simla East, was appointed to hold charge of the duties of the Medical Officer of Health, Simla, in addition to his own duties, with effect from the forenoon of the 17th November, 1933, until further orders.

Under rule I (41) of the Rules and Regulations of the Imperial Council of Agricultural Research, the Indian Research Fund Association has elected Lieut.-Col. A. J. H. Russell, C.B.E., to be its representative on the Imperial Council of Agricultural Research, *vice* Major-General J. D. Graham, C.B., C.I.E., K.H.S., resigned.

Lieut.-Col. K. G. Gharpurey, Civil Surgeon, Belgaum, is appointed to officiate as Surgeon-General with the Government of Bombay during the absence on leave of Major-General H. R. Nutt, V.H.S.

Lieut.-Col. K. S. Thakur, Civil Surgeon, Howrah, is appointed as Civil Surgeon, 24-Parganas, *vice* Lieut.-Col. A. Denham White.

Lieut.-Col. M. Das made over charge of the Midnapore Central Jail to Capt. R. Linton on the afternoon of the 7th February, 1934.

Lieut.-Col. E. H. V. Hodge, Civil Surgeon, Dacca, is appointed to act as Professor of Medicine, Medical College, and First Physician, Medical College Hospital, Calcutta, *vice* Lieut.-Col. J. D. Sandes, granted leave.

In partial modification of previous notification His Excellency the Governor of Bengal has been pleased to appoint Lieut.-Col. E. H. V. Hodge, Officiating Professor of Medicine, Medical College, Calcutta, to be Honorary Physician to His Excellency, during the absence, on leave, of Lieut.-Col. J. D. Sandes.

The following persons have been duly nominated under clause (a) of sub-section (1) of section 3 of the Act as members of the Medical Council of India constituted under section 3 of the Indian Medical Council Act, 1933 :—

1. Lieut.-Col. C. Newcomb, Chemical Examiner, Madras, and Professor of Chemistry, Medical College, Madras.

2. Major S. L. Bhatia, M.C., Dean of the Grant Medical College, Bombay.

3. Colonel A. H. Proctor, D.S.O., V.H.S., Inspector-General of Civil Hospitals, U. P.

4. Colonel C. H. Reinhold, M.C., Inspector-General of Civil Hospitals, Punjab.

5. Lieut.-Col. P. S. Mills, Civil Surgeon, Ranchi.

6. Colonel K. V. Kukday, C.I.E. (retd.), (from the C. P.).

7. Colonel J. P. Cameron, C.S.I., C.I.E., V.H.S., Inspector-General of Civil Hospitals and Prisons, Assam.

Major T. H. Thomas, Civil Surgeon, Mymensingh, is appointed, until further orders, as Civil Surgeon, Dacca, *vice* Lieut.-Col. E. H. V. Hodge.

The services of Major W. J. Webster, M.C., an officer of the Medical Research Department, are placed temporarily at the disposal of the Government of Madras for appointment as Officiating Assistant Director, King Institute, Guindy, with effect from the date on which he assumes charge of his duties.

Major G. C. Maitra is placed on foreign service under the Association of the Pasteur Institute of India, Kasauli, for appointment as Director of that Institute, with effect from the date on which he assumes charge of his duties.

Major R. C. Wats is appointed temporarily to the Medical Research Department and is placed on foreign service under the Indian Research Fund Association with effect from the date on which he assumes charge of his duties.

Major J. G. Bird, an Officiating Agency Surgeon, is confirmed as an Agency Surgeon under the Government of India in the Foreign and Political Departments.

Captain H. S. Waters, Officiating Resident Medical Officer, St. George's Hospital, Bombay, is placed in charge of the post of Superintendent of the Hospital in addition to his own duties, as a temporary measure, pending further orders.

Captain H. S. Waters is appointed to officiate as Professor of Midwifery and Gynaecology, Grant Medical College, and Superintendent, Bai Motlibai and Sir D. M. Petit Hospitals, Bombay, during the absence on leave of Lieut.-Col. W. C. Spackman.

The services of Captain D. M. Fraser are placed temporarily at the disposal of the Government of U. P. with effect from the 22nd January, 1934.

LEAVE

Lieut.-Col. J. Taylor, D.S.O., Director, Central Research Institute, Kasauli, is granted combined leave for seven months, with effect from the 20th March, 1934, or subsequent date from which he may avail himself of it.

Lieut.-Col. W. C. Spackman, Superintendent, Bai Motlibai and Petit Hospitals, Bombay, and Professor of Midwifery and Gynaecology, Grant Medical College, Bombay, is granted leave on average pay for eight

months followed by leave on half average pay for four days, with effect from 13th May, 1934, or subsequent date of relief.

Lieut.-Col. W. L. Harnett, C.I.E., Professor of Surgery, Medical College, and Surgeon to the Medical College Hospitals, Calcutta, is allowed leave for the period from the 24th March or date of availing to the 6th June, 1934.

Lieut.-Col. C. A. Godson, Civil Surgeon, Hooghly, is allowed leave for seven months, with effect from the date of relief.

Lieut.-Col. J. D. Sandes, Professor of Medicine, Medical College, and First Physician, Medical College Hospital, Calcutta, is allowed leave for eight months, with effect from the 5th March, 1934, or the date of availing.

PROMOTIONS

Lieut.-Col. to be Colonel

N. M. Wilson, O.B.E. Dated 7th November, 1933. With seniority 1st August, 1928.

Majors to be Lieut.-Colonels

N. D. Puri. Dated 31st January, 1934.

J. B. Vaidya. Dated 31st January, 1934.

To be Captain (on probation)

P. V. Karamchandani. Dated 13th January, 1933. With seniority 26th February, 1925.

(Previous notifications, in so far as they relate to this officer, are cancelled.)

RETIREMENTS

The undermentioned officers retire :—

Lieut.-Col. A. Kennedy, 5th January, 1934.

Lieut.-Col. G. G. Hirst, 24th January, 1934.

RESIGNATION

Captain J. H. Crawford resigns his commission, 2nd September, 1933.

Notes

PHILIPS' X-RAY EXHIBITION IN PARIS

PHILIPS' new demonstration hall for x-ray apparatus was officially inaugurated last week in Paris, the ceremony being attended by a large number of French radiologists.

The French scientists were very keenly interested in the functioning and application of the various types of 'Metalix' x-ray apparatus. The pioneering work that has been done in Philips' laboratories in constructing x-ray tubes giving complete protection against the harmful effect of x-rays, was fully appreciated by the French physicians, who were also very favourably impressed by the high degree of technical perfection attained in the construction of these apparatus.

Special interest was roused by 'Rotalix' tubes ('Metalix' tubes with a rotating anode) which render it possible to take radiograms with a very short exposure time (down to three-hundredths of a second), giving a very sharply-defined picture which is of great diagnostic value.

Visitors also expressed admiration for the various types of x-ray apparatus designed for other purposes, such as for instance the small dental apparatus, which enables dentists to carry out their diagnosis in a very few minutes, and the apparatus for material testing, which is finding more and more widespread adoption in industrial establishments.

COMPLIGON

NUMEROUS vaccines for the treatment of gonorrhoea have made their appearance, without, however, effecting any real progress in the therapy of gonorrhoeal complications. Auto-vaccines, as well as the recently recommended living vaccines, are regarded by some authors as an advance in this direction.

Compligon, as prepared for the first time by Pieper and Wolfenstein and introduced into therapy by them, represents a new and important advance in this field of medicine.

Compligon is not a vaccine but a bacteria-free toxin manufactured by a patented process. It contains the metabolic products which are excreted during the life of the gonococci (exotoxins) as well as the body substances liberated when they are killed (endotoxins).

The choice of our particular culture medium excludes the danger of anaphylaxis since no extraneous proteins are present. *Compligon* is free from corpuscular components (bacterial cells). As a consequence the preparation does not deteriorate with age, as do vaccines by autolysis of the bacteria they contain. Accordingly it has always the character of a fresh vaccine. The preparation is stable to such an extent that it undergoes no alteration whatsoever even if subjected to a temperature of 60°C. for weeks, or heated up to 100°C. for several hours at a time. *Compligon* is thus particularly suitable for the specific treatment of gonorrhœa in the tropics.

Compligon is a light-yellow, weakly-alkaline liquid, either clear or slightly opalescent and contains 0.5 per cent carbolic acid to ensure sterility.

Clinical indications.—*Compligon* is primarily indicated for the specific treatment of gonorrhœal complications in men and women. It has proved particularly valuable in adnexial and general diseases of gonorrhœal origin, for instance gonococcal arthritis.

In their first publication, in which the theoretical bacteriological foundation of *Compligon* was discussed, Pieper and Wolfenstein also reported on 35 cases of gonorrhœal complications in the male which were treated with *Compligon*. On the basis of experience extending over a number of years they have come to the conclusion that treatment with *Compligon* is by far superior to the previous therapy with vaccines.

COW AND GATE MILK FOOD

THE remarkable series of successes gained by that well-known product 'Cow and Gate Milk Food' have been increased recently by an additional *Gold Medal* which was awarded in October at the Mysore Dasara Exhibition. Over 100,000 people visited the exhibition, including members of His Highness the Maharajah's family, many state officials, and visitors from as far away as Bombay and Delhi. The awards were distributed by the Dewan of Mysore.

It will be recollected that this infants' food also gained a gold medal earlier in the year at the 'All-India Sanitary and Scientific Exhibition'.

In the last few years 'Cow and Gate Milk Food' has gained a firm hold on the affections of mothers throughout India, and that this preference is based on very solid and scientific grounds is evidenced by the increasing prescription and recommendation of the food by the medical profession and the grant of honours such as has just been described.

THE MARMITE FOOD EXTRACT

FROM the clinical point of view the significance of the discovery of the hæmatopoietic properties of marmite is obvious. From the theoretical aspect, namely, the study of the ætiology of anæmias, the discovery is also an advance.

According to the theory postulated by Strauss and Castle (*Lancet*, 16th July, 1932, p. 111), normal hæmatopoiesis is dependent upon the interaction of an intrinsic factor present in healthy human gastric juice, and an extrinsic factor supplied by certain food materials. Hyperchromic anæmias are considered to be due to a deficiency of this product of reaction—a deficiency which may be caused by lack of either intrinsic or extrinsic factor or by inability to utilize the fully-formed product.

Work on the ætiology of the anæmias has centred round this hypothesis for some time, with the result that it is generally conceded that some macrocytic

anæmias may be cured simply by supplying sufficient extrinsic factor, whereas in other anæmias notably in Addisonian pernicious anæmia, there is also a deficiency of intrinsic factor, and cure is only possible if the complete hæmatopoietic factor is supplied.

From the study of the hæmatological picture in cases which are considered to require only the extrinsic factor, marmite therapy has without doubt proved effective, and it seems justifiable to assume that marmite is one source of the extrinsic factor.

In view of the fact that certain cases of pernicious-like anæmia have been shown to respond to marmite in adequate doses, some authorities have gone so far as to suggest that marmite, in common with liver, contains the fully-formed hæmatopoietic factor, the exact nature of which still remains obscure, though their views have not received universal acceptance.

The special applicability of marmite—whether used as a medicine or as a food—in India and in other tropical countries deserves mention. It is noteworthy that the anti-anæmic properties of marmite were first discovered in India. That there is urgent need for improvement in the diet of the Indian people is stressed repeatedly by McCarrison ('Problems of Nutrition in India', *Nutrition Abstracts and Reviews*, July 1932, p. 1) and others. Avitaminosis B and anæmias are perhaps even more prevalent in India than at home and this in itself is sufficient reason for the wide use of marmite.

A further explanation for the great demand for marmite in India is found in the fact that it is purely vegetable in origin and may therefore be taken with impunity by all those who, for religious or other reasons, insist upon a strictly vegetarian diet. Another point of practical importance is that marmite is economical in use and is not affected by climatic conditions.

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Original Articles

A STUDY OF VITAMIN-A DEFICIENCY IN CEYLON WITH SPECIAL REFERENCE TO THE STATISTICAL INCIDENCE OF PHRYNODERMA AND 'SORE MOUTH'

By LUCIUS NICHOLLS, M.D., B.C., B.A. (Cantab.)
Director of the Bacteriological Institute, Ceylon

THE principal aim in life of the poorer classes of Asia appears to be the production of a family; they multiply to an extent that is only limited by the available food supply; and the spectre of starvation is never far away. Their diets consist of some staple comestible, such as rice, and vegetables; and these may or may not be augmented by a small quantity of dried or fresh fish, and on rare occasions by curds or meat. The fat-soluble vitamins are present in quantities in the more expensive comestibles of animal origin, such as eggs, milk, butter and liver, which these indigent people cannot afford; vitamin A also occurs in green leaves and certain vegetables procurable in quantity only in season.

Therefore it might be expected that signs of the deficiencies of the fat-soluble vitamins should be rife among them, especially in those parts where the dry season spreads over many months each year, when fresh vegetables become unprocurable.

Dr. L. J. Harris (1933) states:—'Recent official reports show that no less than 80 to 90 per cent of the elementary school population of London gave evidence to having had to some degree rickets, notwithstanding the decreasing severity of the disease as now met with'.

The diet of these London school children is incomparably better than that of the majority of the children of the masses of Asia, where 10 cents (2 pence) a day is a reasonable estimate of the cost to the parents of bringing up a child. Yet over 5,000 school children in Ceylon have been inspected recently, and the bone changes of rickets were found in only one of them. Rickets occasionally occurs in Ceylonese children soon after they are weaned, and usually each case has followed some illness which has caused the child to be confined for a long time in a dark dwelling; and the common termination is not recovery, but death.

Although the fat-soluble vitamins are deficient in the diets of the poorer classes of Ceylon, fortunately for the children vitamin D, a lack of which causes rickets, can be elaborated in the body by exposure to the sun, and those of school age must obtain an ample supply in this way. But vitamin A is another matter; it must be supplied ready formed, or

as the provitamin, carotene, in the food. Hawk and Bergeim (1931) sum up the effects of vitamin-A deficiency as 'due to a generalized disturbance of the metabolism of epithelial tissue'.

When albino rats are supplied with a diet lacking vitamin A, but sufficient in other respects, the principal changes that take place in them may be summarized as:—

(a) Eyes—The outer layers of the cornea undergo necrosis.

(b) Alimentary canal—The cells of the salivary glands degenerate, the epithelium of the ducts proliferates and the lumen becomes partly occluded. The mucous-secreting cells of the intestines are atrophied and the tips of the villi are necrosed.

(c) The upper respiratory tract, particularly the nasal passages, the trachea, and bronchi, shows transformation of the lining epithelium into a stratified epithelium of flattened cells, which undergo keratinization.

Therefore the signs of vitamin-A deficiency in man should be sought by an examination of the epithelial tissues.

In a recent paper (1933) I have described a skin eruption, which is prevalent among the prisoners in the jails of Ceylon. The eruption is frequently accompanied by keratomalacia, nerve symptoms, and a decreased resistance to dysentery; and evidence was brought forward to show that it is due to vitamin-A deficiency. I proposed the name phrynoderma (toad skin) for this condition. When the prisoners were being inspected for phrynoderma many of them complained of soreness of their mouths; but at that time these complaints were ignored, and the importance of this mouth symptom was not recognized. More recently a large number of children in schools and adults in jails, asylums, a factory and hospitals have been inspected; and evidence has been forthcoming that not only phrynoderma but also 'sore mouth' is a sign of vitamin-A deficiency; and although there are other results of this deficiency, such as keratomalacia, nerve symptoms and a lowered resistance to infections, these two are the most frequent signs, and a statistical examination for them among the various sections and classes in a community will show the relative degrees of this deficiency.

It is necessary when collecting statistics of the incidence of such symptoms to work to fairly definite standards, so that one observer should obtain results that are comparable to those obtained by another observer.

STANDARDS OF EXAMINATION

Phrynoderma.—This is a papular skin eruption, due to the blocking of the ducts and enlargement of the sebaceous glands. (It is comparable with the changes which take place in the salivary glands of rats which have been fed on a diet lacking vitamin A). This eruption is sometimes accompanied by a dryness and scalliness of the skin.

The eruption occurs most commonly on the extensor surfaces of the arms and legs (*vide* plate III, figs. 1, 2, 3, 4 and 5); it may occur on any part of the body, but it is not common on the face, neck, hands and feet.

The eruption ranges from a just-perceptible enlargement of the sebaceous glands on the extensor surfaces of the arms to marked enlargement of these glands over the greater part of the body.

The following standards have been adopted :

(1) There must be perceptible enlargement of the glands on the extensor surface of one or both arms. This situation is adopted for these reasons:

(a) The enlargement of the glands on other parts of the body without enlargement of the glands on the extensor surfaces of the arms occurs among Ceylonese in only about 2 per cent of cases, and this will not materially affect the statistics of prevalence.

(b) It is the easiest situation of the body to examine in persons wearing clothes.

(c) The examination of the legs, etc., of women and girls must be avoided.

(2) The enlarged glands must be palpable.

(3) When the glands over and for three inches below the olecranon process show slight and uniform enlargement, and there is no enlargement of the glands of the arm above and below this situation, the case is recorded as negative. But when these glands over and for three inches below the olecranon process show slight uniform enlargement, and more than two of them show marked enlargement such as is shown by the glands in figure 3 of plate III the case is recorded as positive.

'Sore mouth'.—The standard adopted has been patches of superficial erosion of the mucous membrane of the tongue or lower lip, or its later stages, when the tongue becomes red and glazed. These patches are red and are in marked contrast to the unaffected parts of the tongue which show the whitish *duvet* of the slight normal fur. Some children with sore mouths have excoriation and ulceration of the angles of the mouth, as shown in plate IV, fig. 8. But when they have this condition without signs of erosion of the mucous membrane of the tongue or lower lip they are considered negative.

These standards for phrynoderma and sore mouth may be somewhat arbitrary, but without such standards many doubtful cases would be included in the statistics.

THE INCIDENCE OF PHRYNODERMA AND 'SORE MOUTH'

Schools.—There are several hundred schools and colleges in Ceylon and these may be divided into three classes :—

(a) Vernacular schools, where free education in the vernacular language is given to the poorest classes.

(b) English schools, where small fees are charged for an education in English and the vernacular languages; the children of these schools may be considered to belong to the middle class.

(c) College schools, where the standard of education is much the same as in the best class schools in England. The children of the upper class Ceylonese attend these schools.

Table I shows the incidence of phrynoderma in schools :—

TABLE I

	Number of children examined	Number positive for phrynoderma	Percentage positive
Colombo vernacular schools.	1,164	335	28.7
Vernacular schools along south-west coast road.	2,628	768	29.2
Deaf and blind school.	307	71	23.1
English schools along south-west coast road.	219	39	17.7
Colombo English schools.	353	55	15.5
Colombo college school boarders.	136	4	2.8
Youths in industrial department of the deaf and blind school.	26	0	..
A charity boarding school for destitute children.	47	39	83.0

After the importance of 'sore mouth' had been recognized all children were inspected for phrynoderma and sore mouth.

Table II shows the incidence of sore mouth in the schools :—

TABLE II

	Number of children examined	Number positive for sore mouth	Percentage positive
Colombo vernacular schools.	831	80	9.6
Vernacular schools along south-west coast road.	2,628	204	7.7
English schools along south-west coast road	219	12	5.5
Colombo English schools.	353	30	8.4
Colombo college school boarders	136	0	..
A charity boarding school for destitute children.	47	13	29.2

The workmen in an engineering factory.—The workers in the factory in question were all men. Owing to the depression they were working for three days a week only, and the

PLATE III



Fig. 1.



Fig 2



Fig. 3.

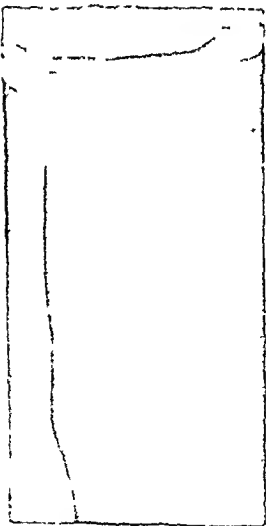


Fig 4



Fig. 5.

PLATE IV



Fig. 6.



Fig. 7.



Fig. 8.



Fig. 9.

average pay of each man was Re. 1.50 a day. Table III shows the result of the inspection:—

TABLE III

	Number inspected	Number positive for phryno-derma
Men working in the foundry	23	0
Men working in the black-smith shop.	31	1 (slight)
Men working in the machine shop.	40	1 (marked) 1 (slight)
Men working in the bridge shop.	67	0
Men working in the carpenter's shop.	31	1 (slight)
Men working in the boiler house.	3	0
	195	4

This gives a sufficiently accurate normal standard for comparison with other groups of adults.

Patients in a mental asylum.—A very interesting state of affairs was found at a mental asylum. The medical superintendent lined up for inspection 132 Ceylonese patients on Ceylonese diet, and in the same court-yard lined up 48 Ceylonese patients on European diet so called. Then 100 women on Ceylonese diet and 33 on European diet were inspected.

Table IV shows the results:—

TABLE IV

	Number examined	Number positive for phryno-derma	Percentage
Men on Ceylonese diet.	132	58	43.8
Men on European diet.	48	1	2.0
Women on Ceylonese diet.	100	44	44.0
Women on European diet.	33	1 (a recent admission)	..

The contrast between the skins of those on these two classes of diet was very striking and a biological experiment could scarcely have been better arranged.

These diets will be discussed later in this paper.

The male section of the asylum is somewhat overcrowded but the female section is not.

Patients in a leper asylum.—Two hundred and thirty-four male patients were examined in a leper asylum, and only one patient was markedly positive for phrynodermia, and the appearance of it suggested that the eruption

was clearing up. He had nerve leprosy, and his history was that he had been in the leper asylum for 5 months and was discharged; he returned after 1½ years; during this time he was poverty-stricken; he had been in for 3 weeks since readmission. Three patients who had been in for 4 months or less showed slight signs. But one patient who had been in for 4 years showed slight signs.

The leper asylum is overcrowded, there are 505 beds and 678 patients, so that 173 patients must sleep on mats where they can find room to place them. This overcrowding was very marked in a temporary building which has a *kadjan* roof and a cow-dung floor. There were 67 patients in this building but none had signs of phrynodermia. This indicates that overcrowding does not affect the incidence of this eruption.

A tuberculosis sanatorium.—Only five cases of phrynodermia have been discovered among over a hundred patients, who had been in various hospitals for a month or more, and were receiving presumably a diet adequate in vitamin A. Three of these patients were suffering from advanced abdominal tuberculosis.

(The fourth case was of a woman where the diagnosis was neuritis. Her history indicated that she had had advanced phrynodermia and neuritis and had nearly died. The fifth case was of a deaf, dumb and blind cripple who had been in hospital for 11 years; he was in a state of extreme infantilism, probably of the Lorain type, in which the pituitary gland has failed to develop. This is interesting because of the possible interrelation between hormones and vitamins.)

The existence of phrynodermia in the tuberculous patients suggested that the increased metabolism of the body to tuberculosis might call for a greater supply of vitamins than are necessary for a healthy person. This would make the treatment of tuberculosis patients with large doses of cod-liver oil less empirical than heretofore. Therefore a tuberculosis sanatorium was inspected, and table V shows the results:—

TABLE V

	Number examined	Number positive for phryno-derma
Men ..	102	6
Women ..	75	5

Five of the six men, who had phrynodermia, had been in the sanatorium for less than one month, and none of the six had received cod-liver oil.

Four of the five women, who had phrynodermia, had been admitted during the previous

fortnight and the fifth had been in for two months; none of them had received cod-liver oil.

The diet of the patients includes milk and butter, and, because phrynoderma occurs among those recently admitted and is almost absent among the older residents, it is concluded that the diet is adequate in vitamin A.

Jails.—In a previous paper (Nicholls, 1933) it was recorded that the prisoners, who had been imprisoned in a certain jail for one month or less, were relatively free from phrynoderma; that this skin condition was very prevalent among those who had been in for periods up to $1\frac{1}{2}$ years; and that there was a small lessening of this prevalence among the residents who had been in jail for more than $1\frac{1}{2}$ years. Since that paper was written many more prisoners in other jails have been inspected with very similar results. The prisoners can be divided into two categories for the purpose of a brief table in this paper:—

Category I, those who have been in prison for one month or less.

Category II, those who have been in prison for more than one month.

TABLE VI

	Number examined	Number positive for phrynoderma	Percentage positive
Category I ..	420	44	10.4
Category II ..	928	508	54.7

I have inspected for sore mouth the prisoners of only one jail—the Southern Province Jail, which has a reputation of being a healthy jail; it is exceptional in that only local prisoners that have been sentenced to six months or less are retained; and as most of them earn remissions from their sentences, only six of them had been in for more than five months.

Table VII gives the results of the inspection:—

TABLE VII

	Number examined	Number positive for phrynoderma	Per cent positive for phrynoderma	Number positive for sore mouth	Per cent positive for sore mouth
Ramnad Jail.	50	5	10	1	..
2 weeks or under.	54	6	11.1		
2 weeks to one month.	33	5	15.1		
Over one month.	58	21	36.2	12	20.6

The increase in prevalence of phrynoderma in these prisoners after they have been in for more than one month, although less, is similar to that for other jails in Ceylon. And sore mouth which is almost absent among the new arrivals becomes prevalent among the old residents. There were two cases of keratomalacia among the prisoners who had been in for more than one month.

The Quarry Jail is 80 miles distant from the Southern Province Jail, and had been inspected before the importance of 'sore mouth' was realized. I was accompanied on the day of my inspection by Dr. G. W. Bartholomeusz, the medical officer of the jail. Two hundred prisoners were examined and the incidence of phrynoderma was 38.5 per cent.

Some time after this inspection I wrote to Dr. Bartholomeusz asking him to make a survey of the prison for phrynoderma, neuritis, keratomalacia, diarrhoea or dysentery, and 'sore mouth'. I had not discussed standards with him and therefore his investigation was independent, apart from the fact that I had shown him a number of cases of phrynoderma.

He has supplied me with tabulated details of each prisoner with phrynoderma; these are summarized as follows:—

He found that 231 prisoners out of a total of 923 in the jail had phrynoderma. This is a percentage of 25.0; which is lower than the percentage in my determinations among a smaller number of these prisoners. It may be that he included only the more marked cases.

The other signs of vitamin deficiency among these prisoners he found as follows:—

TABLE VIII

	Number	Percentage
Neuritis	19	8.2
Keratomalacia	22	9.5
Diarrhoea or dysentery since imprisonment.	62	26.8
'Sore mouth'	103	44.5

Dr. Bartholomeusz states that the diagnosis of 'sore mouth' was founded on 'glazed raw red tongues in varying degrees'.

The name of each prisoner and the time he had been in jail is stated in his tables and from this the prisoners may be divided into two categories:—

Category I, those who have been in for one month and less than 6 months.

Category II, those who have been in for more than 6 months.

The results are shown in table IX :—

TABLE IX

	Number of prisoners with phrynoderma	Number of prisoners with sore mouth and phrynoderma	Percentage
* Category I ..	80	23	26.2
Category II ..	150	80	53.6

* One prisoner is excluded as he had been in prison for a few days only.

This shows that 'sore mouth' is twice as prevalent among the prisoners that had been in jail for more than six months.

Dr. Bartholomeusz did not investigate the incidence of sore mouth among all the prisoners, but confirmed his attention to those with phrynoderma. There were 37 cases of phrynoderma and 13 cases of sore mouth in the Southern Province Jail (*vide* table VII); but three prisoners with sore mouth did not show signs of phrynoderma. Therefore 10 cases out of 37, which would fall into category I of table IX, give a percentage of 27, which is nearly the same as 26.2 of table IX. Perhaps such closely approximate results were hardly to be expected from two observers examining prisoners in jails over 80 miles apart, but the figures for the Southern Province Jail are small.

Dr. Subramaniam, the medical officer of another jail, was asked to investigate the number of prisoners with marked signs of sore mouth and to give the date of admission and the duration of the sore mouth in each case.

He has forwarded these records for 47 prisoners, and table X gives the analysis of these :—

TABLE X

Those who had sore mouth on admission	4
Those who acquired it within three months of admission.	0
Those who acquired it between 3rd and 6th month after admission.	10
Those who acquired it more than 6 months after admission.	33

—
47

There were 616 prisoners in the jail at the time of inspection and 126 had been in for less than 3 months.

THE RELATIVE INCIDENCES BETWEEN PHRYNODERMA AND 'SORE MOUTH'

Table I shows that the incidence of phrynoderma is greater in the schools of the poorest classes than in the schools for the better classes. Table II shows that the incidence of sore mouth is similar in this respect; but the two

conditions do not follow one another in uniform curves; for instance the incidence of phrynoderma is greater and the incidence of sore mouth is less in the Colombo English schools than in the schools along the south-west coast road.

The following tables summarize the results for all the children who have been examined for phrynoderma and 'sore mouth':—

TABLE XI

		Percentage of total
Number examined ..	4,380	..
Negative for phrynoderma ..	3,205	73.1
Positive for phrynoderma ..	1,175	26.8
Positive for phrynoderma and negative for sore mouth.	830	18.9
Positive for phrynoderma and positive for sore mouth.	345	7.7
Negative for phrynoderma and positive for sore mouth.	89	2.1

TABLE XII

	Percentage
The incidence of sore mouth among those with phrynoderma.	29.3
The incidence of phrynoderma among those with sore mouth.	79.4
The percentage absence of phrynoderma among those with sore mouth.	20.5

Table XII shows that the incidence of sore mouth among children with phrynoderma is 29.3 per cent, which is in close agreement with the percentages 27 and 26.2 found among the prisoners of two jails.

If there was no aetiological relationship between phrynoderma and sore mouth, the incidence of phrynoderma among children with sore mouth would be the same as for all the children in the schools, namely 26.8, and not 79.4 as is shown in table XII.

As previously stated there were thirteen prisoners in the Southern Province Jail who had sore mouth and ten of these had phrynoderma, giving a percentage of 81.2, which is in close agreement with the 79.4 percentage for the school children.

DIETS IN CEYLON

Condiments are much used by all classes of Ceylonese; when a preparation of condiments is liquid it is called a curry, and when it is more-or-less solid it is called a sambol.

There is a subtle acidity and pungency in the smell of these preparations, which will cause a flow of saliva and an increase in appetite even in those who seldom partake of them. The use of condiments has been developed for the purposes of dispelling among the poorest classes the anorexia which arises from a deficient food supply; or to stimulate the surfeited appetites of the gourmets among the wealthy.

The following are some of the condiments used in curry making in Ceylon:—

Coriander, anise, dill fruit, pepper, mustard, chillies, saffron, various aromatic leaves, tamarind, cinnamon, onions, garlic, vinegar, cloves, cardamoms and nutmegs. A selection of these are boiled with salt in coconut milk in making the best curries, but the poor must often be content with a watery concoction of chillies, salt, onions and lime juice. All curries and sambols contain lime juice or tamarind.

A knowledge of the diets of the poorer classes is not easily obtained, because they are apt to resent a close inquiry into their intimate affairs; and some will plead poverty, and represent their diet worse than they are, while others will exaggerate the quality of theirs.

Mr. Richard de Silva of this laboratory made an enquiry into the dietary of over 100 children in a vernacular school. They were supplied with writing material and sent home to work out with their parents the composition of every meal that they had had for the past seven days. When these papers were collected and examined it was found that the children had had the usual three meals a day and had mentioned 83 comestibles*. The names of the comestibles may be placed into groups, for instance:—the children mentioned five varieties of hoppers, six varieties of dried fish, and numerous kinds of vegetables most of which fall into one of three groups:—

- (1) Watery vegetables, such as snake gourds and cucumbers.
- (2) Leaf vegetables of which the leaves only are eaten.
- (3) Other vegetables such as plantains and yams.

And thus it was found that their diets consisted of rice, dried fish and small amounts of vegetables daily.

This enquiry was made in September, and had it been made at another season of the year the names of other foods would probably have preponderated in the lists, for instance if bread fruit and jak fruit had been in season, the names of these would have appeared in all the lists.

Two children had received meat at one meal only. No one had had butter or ghee, and only two had had milk. A few of them had tomatoes or sweet potatoes at one or two meals during the week.

The children partake of three meals a day. These are of the following nature:—

(1) *Early-morning meal.* This consists of either cold boiled rice or hoppers eaten with a small quantity of sambol. The commonest kind of hopper is made by kneading ground rice with coconut milk, and roasting it on a hot plate, when its shape resembles that of a thick pancake.

The commonest sambol is made by grinding chillies, salt, onions and a fragment of Maldivian fish between stones, and adding lime juice to the ground mass.

*Tables of the diets of the children and prisoners (v.i.) have been deleted from this paper to economize space.

(2) *The midday meal* consists of boiled rice and a little curried dried fish or vegetables.

(3) *The evening meal* is made from what is left over from the midday meal.

The children only occasionally receive such vegetables as tomatoes, which are fairly rich in vitamin A.

Many tropical vegetables have not been biologically assayed for the vitamin-A content, but by analogy they may be placed in the same categories with other vegetables, which have been assayed.

G. S. Fraps and Ray Treiehler (1933) have published lists giving the Sherman-Munsell rat units for vitamin A in each ounce of various foods.

I have adopted these units in an attempt to estimate the amount of vitamin A in the diets of children and others. When the vitamin-A content of a vegetable is unknown I have assigned to it a much higher number of units than it probably contains. For instance a snake gourd resembles a cucumber in appearance, and gives a very similar analysis (*vide* table XIII); the vitamin-A units in cucumber have been determined as 10 per ounce, but I have allowed 70, which is the same as for pumpkin. The water pumpkin of Ceylon resembles water melon of which the vitamin-A content has been determined as 28, but 70 units per ounce have been allowed. All green leaves have been assigned 410 units, making them of much the same value as spinach of which the vitamin-A content has been determined as 402; and this is the maximum for green leaves which have been assayed, with the possible exception of lettuces.

Manioc and yams are assigned the same value as sweet potatoes.

Table XIII gives the analysis of some of these vegetables and in the penultimate column is shown the vitamin-A units of those vegetables which have been assayed, and in the last column are shown the units per ounce which have been allowed in the calculations of the vitamin-A content in the diets of children, prisoners and others.

It follows that the actual amounts of vitamin A in the diets are probably much lower than the estimated amounts.

Forty-one women were supplied with vegetables and requested to separate those quantities from each of them which they considered would be ample for the daily needs of a child aged 12. These 41 quantities of each vegetable were weighed; the weights varied from 1 ounce to 2½ ounces for green leaf vegetables, and the average was 2 ounces. Similarly for other vegetables such as snake gourd and plantains the average weight was 3 ounces approximately.

These quantities have been used for estimating the number of units of vitamin A in the children's diets. The rice consumed by these children was imported polished rice, which contains little, if any, vitamin A. A small

TABLE XIII

Showing relative composition and vitamin units per ounce of certain vegetables

Vegetable	Water	Protein	Oil	Carbo- hydrate	Fibre	Ash	Vitamin-A units determined	Vitamin-A units allowed
Cucumber	95.4	0.87	0.16	7.87	0.71	0.40	10	10
Snake gourd	94.6	0.63	0.13	4.25	0.13	0.28	..	70
Pumpkin	89.0	1.7	0.7	6.60	1.7	0.60	70	70
Spinach	90.6	2.5	0.5	3.8	0.9	1.7	402	410
Tampala (leaf).	81.4	4.5	0.57	8.4	2.0	3.16	..	410
Kankun (leaf).	89.7	4.25	0.04	3.64	0.7	1.67	..	410
Sweet potatoes.	71.1	1.5	0.4	24.7	1.3	1.0	85	90
Manioc	74.2	1.10	0.18	22.9	1.15	0.52	..	90
Yams	63.7	2.86	0.05	27.31	1.03	1.45	..	90

amount may be present in dried fish and condiments but not enough to affect these estimates materially.

Fraps and Treichler (1933) estimate that 1,000 units per day per person are required by man, woman or child and state:—'This may not be ample for the highest health and vigour, but should be sufficient for growth and maintenance'.

Only one of the children received 1,000 units or more, the daily average was 312 units.

Prison diets.—The kind and quantity of the comestibles in these diets are laid down by law and may not be varied except for prisoners in hospital. There is a penal diet and each prisoner receives boiled polished rice and 4 ounces of a vegetable daily for the first fortnight of imprisonment; during the second fortnight he receives only 2 ounces of a vegetable, but there is added to the diet 2 ounces of plantain and 2 ounces of *dāl*. Thereafter for a year he receives daily the following diet:

	Ounces		
Bread 4
Rice 18
Lean fish 2½
Plantain 2
One vegetable 2
<i>Dāl</i> 2
Sugar ½
Coconut ¼
Lime (juice) ½ (a lime)
Onions ½
Chillies, pepper and salt q.s.

The records of the daily supply of vegetables throughout the year were obtained from the offices of 10 prisons.

The average number of units which have been received in the vegetables daily by the prisoners in the various jails is 162. When 120 units for 2 ounces of plantain, 140 units for 2 ounces of *dāl*, and 100 units for the bread are added, each prisoner received daily 522 units.

The diet of the patients in the mental asylum.

—The Ceylonese diet of the patients is somewhat better than the diets of the prisoners, but not greatly so, as can be shown by the fact that the cost of the daily diet for each patient is only 2½ cents (½ penny) more than the average for each prisoner in the various jails. The 'European' diet costs 10½ cents more than the 'Ceylonese' diet; and the difference in the two diets can be summed up as follows:—

	European diet	Ceylonese diet
Bread	12 ozs.	8 ozs.
Rice	6 "	16 "
Eggs	2 "	nil.
Milk	5 ozs.	nil.

An estimate similar to that made for the prison diets shows that the patients on Ceylonese diet should receive about 620 units of vitamin A daily.

The contents of Ceylon eggs weigh about 1½ ounces. The units in eggs have been shown by assay to be 550 per ounce at the beginning of the laying season and to fall to 170 per ounce at the end of the season. Therefore a conservative estimate of 200 per ounce may be allowed, which is 600 units for two eggs. An equally conservative estimate for milk is 40 units an ounce, which is 200 units for 5 ounces.

Therefore the patients on European diet receive at least 1,400 units daily.

If this is considered with the facts shown in table IV, it follows that the addition of 2 eggs and 5 ounces of milk to a diet is sufficient to prevent phrynoderma.

The diets of the leper asylum and tuberculosis institute.—The diets in these institutions are even more generous than the European diet at the mental asylum; therefore it is not surprising that the older residents are free from phrynoderma.

Diet at the deaf and blind school.—Table I shows that phrynoderma occurred in 23.1 per cent of the children in this school, and that it was not found among 26 youths in the industrial section. The details of the diets have not been obtained, but they have been stated shortly to be as follows:—

	Children	Youths in the industrial section
Rice	A sufficiency	A sufficiency
Vegetable curry	3 ozs.	6 ozs.
Dāl, meat or fish curry	3 "	..
Meat curry .. ..	..	4 ozs.
Fish curry .. ..	..	4 "
Total curries	6 ozs. daily	14 ozs. daily

It follows that the youths probably obtain at least twice as much vitamin A as the children.

Diets of college boarders.—It is sufficient to state that the cost of the diet of the college boarders referred to in tables I and II is three times the cost of the diet of the children in the deaf and blind school.

The diets of a charity boarding school for destitute children.—There is shown in tables I and II a high incidence of phrynoderma and sore mouth in a charity school. Direct and indirect inquiries suggested that the feeding of these destitute children was very bad; but unfortunately actual details could not be obtained. It appeared possible that the children had not recovered from a destitution previous to admission, but this was not so, because there were only eight children among the 47 boarders who were more or less free from phrynoderma, and seven of these had been in the school for less than one month, and the other had been in for two months. And the degree of phrynoderma or sore mouth more or less varied with the length of time that the children had been in the school.

There were in the school 17 children who attended the classes, but lived at home. Four of these had phrynoderma, this gives much the same percentage of prevalence as occurs in other schools in the neighbourhood; but their condition was markedly better than that of the boarders.

This may be a good example of the value of the inspection of school children for phrynoderma and 'sore mouth' as a criterion of the sufficiency of their diets.

Advanced cases of phrynoderma in children.—Four young patients have been seen recently in whom blindness had occurred. One was a child, age 4 years, the right eye was staphylococcal and the left showed opacities from healing corneal ulceration. The child had been unable to walk and at the time of examination

was walking with difficulty, the muscles were wasted, and the feebleness and awkwardness of the arms and legs suggested neuritis. The child had extensive phrynoderma. Two other cases were very similar to this, and both had phrynoderma.

The most advanced case seen was of a boy (age 16) in hospital; his signs and symptoms were:—

(a) General emaciation, but not particularly noticeable in the face.

(b) General phrynoderma of the whole body except the hands, feet and face.

(c) A superficial dermatitis around the eyes and mouth with peeling of the skin (*vide* plate IV, fig. 9).

(d) Right eye—keratomalacia, slight sight. Left eye—commencing staphyloma, blind.

(e) Dermatitis deep seated in auditory meatus. He was very 'hard of hearing'. This deep-seated dermatitis of the ears is not very uncommon in cases of marked phrynoderma.

(f) Neuritis, unable to walk, wrist drop, and absence of knee jerks.

(g) Mental condition—extremely irritable.

(h) There was no erosion of the tongue, but marked erosion of the lower lip.

(i) The temperature had been and was normal.

Advanced cases, in which there are no signs of eye lesions, are fairly common in young indigent children after 6 months of age, that is from about the time when they are weaned; the symptoms are:—extreme emaciation, phrynoderma, sore mouth (in about 60 per cent) and diarrhoea; weakness and wasting of the muscles of the limbs may indicate neuritis. Pyrexia may or may not be present.

THE AETIOLOGY OF BLINDNESS IN CEYLON

Keratomalacia is common in Ceylon; and xerophthalmia keratomalacia, corneal ulceration and staphyloma appear to be the usual sequence leading to blindness.

The lady superintendent of the deaf and blind school has made extracts of the history sheets of all those under her care, which might throw some light on the causes of the blindness (and deafness).

The statements have been placed into the following categories:—

Category I. Those who are recorded as having been blind from birth or shortly after birth.

Category II. Those who presumably have become blind as a result of keratomalacia. The earliest date of blindness after birth for those in this category is stated as three months. The following are the types of statement which have been accepted for placing children in this category:—

'Results of rickets at 3 years'.

'Blindness through malnutrition'.

'Blind through mandama' (marasmus).

'Debility when 5 years old'.

'Disease when 2 years old'.

Category III. Those who are stated to have been blinded as the result of an accident, cataract, smallpox, etc.

Category IV. The history is too indefinite for the first three categories.

Table XIV is the summary of this analysis:—

the patient may not be able to feed himself. But advanced cases are rare except in those who have chronic dysentery. On one occasion

TABLE XIV

		Boys	Per cent	Girls	Per cent	Total	Per cent
Category I	.. ..	17	20.1	11	16.4	28	19.0
Category II	.. ..	49	61.2	48	71.6	97	65.9
Category III	.. ..	7	8.7	1	1.4	8	5.4
Category IV	.. ..	7	8.7	7	10.4	14	9.5
TOTAL	.. ..	80	..	67	..	147	..

Therefore it is probable that about two-thirds of the children are blind as the result of keratomalacia following vitamin-A deficiency.

The deafness is another matter. There were 170 deaf and dumb children in the school. And such statements as:—'followed boil on head', 'adenoids and tonsils', 'after pneumonia' suggest that 20 per cent of them had had middle-ear disease. The remaining 80 per cent of the children are reported to have been deaf from birth. The statement by a parent as to the time when a child became blind may be accepted as correct, but deafness is not noticeable as early as blindness.

GENERAL DISCUSSION

The damage to the epithelial structures from vitamin-A deficiency which occurs in experimental animals has its counterpart in man in the form of phrynoderma, 'sore mouth' and keratomalacia.

But the signs and symptoms which follow this deficiency are more variable than those which follow other vitamin deficiencies, such as in scurvy, pellagra or beri-beri.

In Ceylon phrynoderma is the commonest sign, and perhaps it is not astonishing that the sebaceous glands require a fat-soluble vitamin for the elaboration of the oily sebum. 'Sore mouth' is the next in frequency, yet only about 80 per cent of cases of this condition show marked phrynoderma; and patients may have advanced phrynoderma and keratomalacia without 'erosion of the tongue' as in the case of the boy aged 16 mentioned above. Phrynoderma occurs in a high percentage of cases of prisoners with keratomalacia but not in all cases.

The symptom which has been called neuritis in this and a previous paper requires further elucidation as to the nature of the lesion; it may not be a neuritis. In its earliest stages the patient complains of a burning sensation in the palms of the hands and the soles of the feet. This is followed by muscular weakness, later by wasting of the muscles and an atoxic gait, and later still by inability to walk and great weakness in the arms and hands, so that

when the prisoners in a jail hospital were inspected there were 17 patients with chronic dysentery, and all of them had marked signs and symptoms of this 'neuritis'. Morgan (1929) described a condition termed 'burning feet', which is apparently common among indigent Tamil emigrants in Malaya. He treated 19 severe cases in hospital; the diet he gave them was Indian corn, ragi, eggs and mutton. The pain was less in a week and apparently gone in a fortnight. He appears to have attributed some of the improvement to the administration of nitroglycerine. But the hospital diet is the more probable reason of the rapid improvement. Labernadie (1927), in reference to 'burning feet' said that in 1762 it was recorded from Savigliano in Piedmont and in 1806 among troops in Padua; it was called pedionalgia, or chiropodalgia if the hands were also attacked.

The absence of wide recognition of the effects of vitamin-A deficiency in man may be due to the irregularity of the signs and symptoms, and may explain anomalous observations on infections following this deficiency. For instance vitamin A has been called the 'anti-infective' vitamin, and its deficiency in diets has been supposed to increase the liability to epidemic diseases, especially of the respiratory tract. But this has not received universal acceptance.

Damage to the epithelial tissue of the respiratory tract should render a person more liable to bronchitis or pneumonia than a normal person; and it may be that the stresses of a cold climate will determine that the effects of vitamin-A deficiency shall fall first on the respiratory epithelium. Therefore respiratory diseases may follow vitamin-A deficiency under certain climatic conditions.

Similarly a generally poor diet overcharged with stimulating condiments will throw stresses upon the epithelial tissues of the alimentary tract, and there bring out the effects of vitamin-A deficiency and increase the liability to dysentery. The outbreaks of dysentery among the prisoners in the jails of Ceylon are due to infection with Flexner's bacillus following vitamin-A deficiency.

Three post-mortem examinations have been done on adult male prisoners, all of whom had had phrynoderma and dysentery, and two advanced neuritis. There were the usual dysenteric changes in the large intestine, and in two cases the last foot of the ileum was affected.

The livers weighed 30, 31, and 35 ounces, respectively, and had undergone fatty degeneration of moderate degree. The spleens weighed 3, 3½ and 4 ounces, respectively. Two of these subjects were wasted, but the loss of weight of these organs appeared to be out of proportion to the general wasting. The third subject was not wasted, he had had dysentery for one week only. The walls of the small intestine were thinner than normal, and in two cases slight superficial erosion of the epithelium of the mucosa was seen extending from the lower parts of the jejunum to where the ileum had undergone dysenteric changes. This erosion was not marked in the third subject but the villous processes were seen in microscopical sections to have undergone marked atrophy.

The general health of Ceylon school children.—It is difficult during an inspection to gauge the general health of the children. A child may have considerable areas of the skin affected with phrynoderma, and yet appear to be in fair health. Even those with 'sore mouths' do not appear to be greatly affected otherwise. Some of them appear puny and lethargic. Probably those in bad health remain away from school, and this is reflected in the school attendance lists, which show that the number of absentees daily is large. If the effect of vitamin-A deficiency upon the growth of children is to be estimated it must be done by weighing and measuring them.

The high degree of vitamin-D deficiency in London school children may affect the quality of the population but it does not greatly increase the death rate; but the vitamin-A deficiency in Ceylon school children probably does increase the death rate. Table XV shows the death rates per 1,000 in 1931 for England and Ceylon for young persons up to 20 years of age :—

TABLE XV

	England	Ceylon
Under 5 years	20.0	67.1
5 to 10 years	2.1	7.8
10 to 15 years	1.5	3.7
15 to 20 years	2.5	6.8
All ages	10.2	22.1

The dietary in dysentery.—In *Manson's Tropical Diseases* on page 395, where recommendations are made for a diet in dysentery, there appears the statement:—'The best diet is one consisting of jellies, albumen water,

rice water, chicken conje, beef tea, Brand's essence, arrowroot, sago puddings....' All of these are more or less deficient in vitamin A. Similar diets are recommended in all textbooks, and doubtless are appropriate for well-fed persons, who contract dysentery. But such diets are not indicated where there is vitamin-A deficiency. Many native doctors, following the systems of the East, have obtained a reputation for the treatment of dysentery; they use fresh extract of green herbs, and some of them augment these by prescribing strange meats such as the liver of the land tortoise. Success in such treatment may be due to the unconscious administration of vitamin A in a form easily assimilated. And in countries where this vitamin is markedly deficient in the diets of the poorer classes, the administration of preparations of leaves might be of value in almost any disease.

Proprietary foods.—Many foods reinforced with vitamin D have been placed on the market. These foods are of much value in Europe, especially in towns where the atmosphere is smoke-laden, and the children seldom enjoy sunlight during the winter months. But the food which is indicated for the tropics of the East is one which has been reinforced with vitamin A*.

The knowledge of vitamins.—The acquisition of the knowledge of vitamins started clinically, by scurvy, pellagra, and beri-beri being vaguely attributed to faulty diets. Once animal experiments were initiated the knowledge became more definite. And the science of dietetics could never have been built upon sound foundations without these experiments. But there has developed too great a tendency to apply without modifications the results of deficient diets in animals to the dietary of man.

An example of this is shown in the work of Jansen and Donath (1925) in the Dutch East Indies; when reasoning from experiments on rats these authors concluded that the use of one banana a day will prevent A-avitaminosis in those living upon a rice diet.

The vitamin requirements of one species of animal are not necessarily the same as those of another. For instance albino rats cannot be used in the biological assay for vitamin C, because either this vitamin is synthesized by rats, or they require very small amounts of it.

Laboratory animals lead sedentary and protected lives free from the activities and stresses which wild animals must experience, and this will affect their vitamin requirements. The accessory food factors in a comestible may be determined by animal experiments; but the relative requirements for a caged rat and a hard-working labourer cannot be defined accurately by such experiments. The amount of a vitamin necessary to maintain health varies with the nature of the other components

*and vitamin B we should add.—Error, I. M. G.

in a diet; and may be more for a diet rich in carbohydrates than for one rich in proteins.

A wide field for inquiry exists in the homes of the destitute, the prisons, the asylums, schools, slums and villages of the East by those who have had experience in the signs and symptoms of food deficiencies. Because experiments, almost equal to those of the biochemist, are occurring fortuitously.

The knowledge of human dietetics will be enhanced by such investigations; and the time will come when the number of units of vitamins necessary to maintain health on various diets will be determined as accurately as in the estimation of the caloric units of other components of a diet.

It is possible that phrynoderma is a common condition in other countries, and doubtless has been described on many occasions without its significance being recognized. Malcolm Morris (1917) appears to refer to it under the term xeroderma. Chalmers Watson (1904) describes xeroderma affecting a boy aged 6; he appears to attribute the disease to malnutrition, and mentions the changes in the sebaceous glands, the boy was cured by inunctions of myelocenc and the administration of cod-liver oil.

The condition may have been referred to under such terms as keratosis pilaris, pityriasis pilaris, lichen pilaris, or keratosis suprafollicularis.

Since the work described in this paper was completed there has appeared in the *Archives of Dermatology and Syphilology* a paper by Dr. L. J. A. Loewenthal (1933) wherein he describes a similar dermatosis occurring among the prisoners of the East African jails; he attributes it to a deficiency of vitamin A in the diets. He does not give any definite name to the eruption; but mentions that Dr. A. Pillat described a somewhat similar eruption in 1929.

Therefore it appears that either Dr. Loewenthal or Dr. A. Pillat have priority in attributing this type of dermatosis to vitamin-A deficiency.

REFERENCES

- Fraps, G. S., and Treichler, R. (1933). *Texas Agric. Exper. Station Bull.*, No. 477, July.
Harris, L. J. (1933). *Brit. Med. Journ.*, Vol. II, p. 367.
Hawk, P. B., and Bergeim, O. (1931). *Practical Physiological Chemistry*. P. Blakiston's Son & Co., Philadelphia.
Jansen, B. C. P., and Donath, W. F. (1924). *Mededcel. Dienst. volks-gezondh. Nederl.-Indie*, Vol. I, p. 48.
Labernadie, V. G. F. (1927). *Trans. 7th Congress, Far Eastern Assocn. Trop. Med.* Thacker's Press & Directories, Ltd., Calcutta.
Loewenthal, L. J. A. (1933). *Arch. Dermat. and Syph.*, Vol. XXVIII, p. 700.
Manson-Bahr, P. (1929). *Tropical Diseases*. Ninth Edition. Cassell & Co., Ltd., London.
Morgan, W. B. (1929). *Malayan Med. Journ.*, Vol. IV, p. 69.

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DYSENTERY PRODUCED BY BACTERIUM PSEUDO-CAROLINUS

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BACILLARY dysentery occurs quite commonly in Calcutta. A routine examination of stools in the School of Tropical Medicine, Calcutta, has shown an incidence of bacillary dysentery in 12.5 per cent of the total admission of cases during the year 1933. During the last few years, however, a large number of cases of subacute and chronic type of dysentery admitted to the Carmichael Hospital for Tropical Diseases showed neither the Flexner nor Shiga type of bacilli, but *Bacterium pseudo-carolinus* has been isolated in the stools. To Lieut.-Colonel H. W. Acton, I.M.S., belongs the credit of first observing that the infection with this bacillus produced certain symptoms and that these improved by treatment with autogenous vaccines.

During the summer of 1933 a large number of patients admitted under the senior author in the Carmichael Hospital showed the presence of this bacillus in stools on culture. As our knowledge regarding its pathogenicity is still vague, and as doubts exist as to whether it is actually responsible for producing any definite train of symptoms, it was considered advisable to study carefully a series of cases in order to see if any definite symptoms were really produced in patients when this organism is present in the stools. Agglutination reactions of the blood in a selected number of cases and the effects of treatment of the infection with vaccines and bacteriophage were studied.

Before describing the results of these observations in a series of cases studied by us, a few words may be said about this bacillus which is not very well known to the profession in this country.

Bacterium pseudo-carolinus is a non-lactose-fermenting bacillus occurring in the intestines. It is a non-sporing aerobe and has been referred to by Castellani along with various other similar organisms without any special reference to its position in the standard classification and pathogenicity. From some preliminary work done at the School (Pasricha, 1931) there is evidence to suggest that this organism is a phage-modified variant form of the Flexner type of dysentery bacilli. These bacilli occur

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- Morris, M. (1917). *Diseases of the Skin*. Cassell & Co., Ltd., London.
Nicholls, L. (1933). *Indian Med. Gaz.*, Vol. LXVIII, p. 681.
Pillat, A. (1929). *Arch. Ophth.*, Vol. II, p. 256.
Watson, C. (1904). *Brit. Journ. Dermat. and Syph.*, Vol. XVI, p. 1.

in the form of short slender rods with rounded ends. They are non-motile and are Gram-negative in their staining reaction. When cultured on agar medium, there is a fairly rapid translucent growth. In broth there is uniform turbidity. In blood hæmolysis is not produced. On potato medium they grow well, the colonies having a yellowish tint very much like honey. On MacConkey's medium, from the primary growth, giant colonies are formed after 72 hours with leaf-like structures in the spreading margin which are thin and translucent with shallow radial striations. They have the following fermenting properties:

Lactose	..	0
Glucose	..	acid and gas.
Maltose	..	acid and gas
Mannite	..	acid and gas
Saccharose	..	0
Dulcitol	..	0
Salicin	..	0
Litmus milk	..	alkaline, no change after 72 hours.

Strains of *Bact. pseudo-carolinus*, isolated from patients where the predominant symptom is stasis, ferment salicin with the formation of acid and gas.

During the months of March to September 1933, *Bact. pseudo-carolinus* was isolated from the stools of 40 patients admitted into the Carmichael Hospital for Tropical Diseases. Out of this number, 28 were definitely admitted with symptoms pertaining to the gastro-intestinal tract. Of these nine showed the signs and symptoms of subacute dysentery of the bacillary type, eleven suffered from diarrhoea only, two had constipation alternating with diarrhoea and six had pain in the abdomen. Another group of four patients were admitted with skin conditions pointing to intestinal allergic manifestations, viz, one had psoriasis, two had pityriasis rubra and one had urticaria. The remaining eight patients were admitted for other causes, i.e., three had fever, one had diabetes, one chyluria, one myocarditis, one anarsarca and one infection with *Tinea violacium*. The last two groups of 12 patients, although they were originally admitted into the hospital for other causes, also suffered from definite symptoms pointing to gastro-intestinal disturbance.

It will be seen, therefore, that in this series of patients all showed clinical signs and symptoms pointing to a definite affection of the bowels. In the large majority (28 cases), the symptoms were of acute or subacute in nature and the patients actually sought relief for gut conditions, while in the smaller group of 12 patients the symptoms had become chronic and were masked by other severer affections, but they undoubtedly existed.

The signs and symptoms elicited in these patients were as follows:—

Signs and symptoms.—Most of the patients with this infection complained of flatulence and vague abdominal pains. Some had tenderness in the epigastrium, others showed symptoms of

typical bacillary dysentery of a subacute type, while still others suffered from chronic intestinal stasis with symptoms of constipation alternating with diarrhoea. Some of them continually passed mucus in the stools and came to hospital for this complaint; others had intervals in which no mucus was passed, but every now and then they suffered from diarrhoea with variable quantities of mucus in the stools. Many of the patients complained of pain of a varying degree of intensity after food, i.e., from a feeling of discomfort to pains of a colicky nature. Usually the pain lasted for a few hours, but in some patients it continued much longer and rarely it lasted all day. Blood was sometimes present in the stools, but usually not in large quantities. Tenderness all along the cæcum and colon was a constant feature in some cases. Most of the patients suffered from flatulence and distension, with or without acidity, after meals. The appetite was good in some cases, in others it was impaired and the patient lost weight.

In a number of cases a complete series of skiagrams after a barium meal were taken. The picture presented in the majority was that of stasis in the large gut. Although the emptying time of the stomach and the small intestine was often considerably shortened, the meal reaching the cæcum in two or three hours, the large gut generally, and the cæcum and the ascending colon particularly, were sluggish and distended, and the transverse colon had dropped almost into the pelvis. The tone of the intestinal musculature and peristaltic movements of the large intestines were both inhibited and often the meal was not evacuated even after 48 hours.

Associated with the bowel symptoms, there were in certain cases toxic manifestations, or the allergic conditions of asthma, urticaria, etc. The general health of most of the patients was poor, they were pale, anæmic and very run down. It may be mentioned here that some of these patients had hookworm infection also, but this was generally mild and could not account for all the symptoms present. The colon was palpably thickened in six cases and some of these patients had amœbic infection also. Combined infection with *E. histolytica* and bacillary dysentery is very common in this country and according to Acton and Chopra (1929 and 1933) this form is most difficult to treat. In most of the chronic and relapsing type of cases that came to our hospital this is a common feature. In such cases rarely Flexner and Shiga type of bacilli are found along with *E. histolytica*, but combination with *Bact. pseudo-carolinus* is more commonly met with. This has been shown by case records published by Chopra and his associates (1933-34). In such patients it is difficult to say whether the symptoms produced are due to one organism or the other, but there is no doubt in our mind that the presence of this bacillus

along with these protozoa intensifies the symptoms and renders the cure more difficult.

A few of the patients suffered from low fever, the temperature rising daily towards the evening. Heaviness of the head and headache were common features. The patients looked tired, were mentally depressed, had little inclination for mental work or physical exertion. The tongue was often coated and the breath foul smelling. The blood pressure was usually low and the patient suffered from shortness of breath and palpitation.

Macroscopical and microscopical character of the stool.—The number, colour and consistency of the stools passed was very variable in different cases. The stools were either diarrhoeic, or constipated, pasty looking or hard; they had a more or less normal yellow coloration or were clay coloured. There was both blood and mucus in the stools in seven patients only, nine patients had mucus only, while the large majority, i.e., 24 cases, had neither blood nor mucus in the stools while in hospital.

Microscopical examination of the stools revealed associated protozoal and helminthic infections as follows:—

In the stool of nine patients *E. histolytica* was found, in one case a large number of spirochaetes, in six cases hookworm ova, in seven cases *Giardia intestinalis*. In a certain number of these patients there were multiple infections, but in none was a combined infection with *Bact. pseudo-carolinus* and Flexner or Shiga dysentery organisms found.

Bacterial culture of the stools.—*Bact. pseudo-carolinus* was isolated from all the cases. In a large percentage of cases repeated plating of the stools was necessary to obtain a positive result, as shown below:—

- 16 cases were positive in the 1st plating.
- 8 cases were positive in the 2nd plating.
- 6 cases were positive in the 3rd plating.
- 6 cases were positive in the 4th plating.
- 1 case was positive in the 5th plating.
- 1 case was positive in the 9th plating.
- 2 cases were positive in the 10th plating.

The difficulty of detecting this infection in some patients can thus be readily understood.

Serum reactions.—The isolated organisms were tested with the serum of the respective patients in a selected number of this series with the following results:—

The agglutination was positive in 8 cases, 5 giving the reaction in a dilution of 1 in 160, one in 1 in 80 and one in 1 in 10. Entirely negative results were obtained in 21 patients.

Tests with bacteriophage.—The strains isolated were tested with stock dysentery phage in 16 cases, but only in 8 cases were the bacilli lysable *in vitro* by the bacteriophage used. Even after treatment with bacteriophage the infection could not be eradicated in most of these cases and *Bact. pseudo-carolinus* was isolated from the stools. An interesting case

of two types of *Bact. pseudo-carolinus*, one lysable by phage followed by the appearance of a non-lysable type (after treatment with phage), has been recorded. When phage was prepared for the resistant strain and the patient was treated with it, the infection disappeared and the patient improved considerably.

Discussion.—A perusal of what has been said above will show that *Bact. pseudo-carolinus* is met with in the stools of a large number of patients admitted into the Carmichael Hospital for Tropical Diseases suffering from gastrointestinal symptoms. Looking at it purely from the clinical point of view, it is remarkable that infection with this bacillus has been diagnosed with increasing frequency during the years that roughly coincide with the introduction of treatment with bacteriophage. This may mean one of three things. Firstly, it may be a mere coincidence; the second possibility is that attention has only been directed towards this bacillus during these years and that therefore it is being isolated more frequently; the third possibility is that this bacillus may be a phage-modified form of dysentery bacilli particularly of the Flexner type. The third proposition is of very great importance from our point of view, but it is very difficult to come to any definite conclusion with regard to it without careful bacteriological study.

The association of the bacillus with chronic infection with *E. histolytica*, hookworm, etc., has been brought out in our series of cases. It is possible that some of the symptoms described may be produced by the allied conditions and not by this bacillus. A careful study of the signs and symptoms, taken as a whole, in this series, and in a large number of other cases, not so thoroughly studied, leads us to believe that the train of symptoms produced can be definitely assigned to the presence of this organism. The group of symptoms appear to form a definite entity not met with in any of the concomitant infections. In this opinion we are supported by Miss North, the nursing sister-in-charge of the hospital, who is a very acute observer and who has watched hundreds of these patients. Although a clinical study of this nature cannot supply a definite proof of the pathogenicity of this bacillus, our impression is that the presence of this bacillus in the gut does give rise to a train of symptoms which are not met with in other intestinal infections commonly encountered in Calcutta. Whether this bacillus is responsible for the production of these symptoms or whether it is merely a passive associate on account of certain conditions set up in the gut by some factor or factors, it is difficult for us to say.

The agglutination reactions obtained in this series were inconclusive. In 8 cases the agglutination titre of the serum was fairly high (1—80 to 1—160), but in the majority no reaction could be obtained.

Only a complete bacteriological study can throw light on the pathogenicity of this organism and we are glad that Captain C. L. Pasricha, I.M.S., and his associates in the Department of Bacteriology have taken up this study. All that we are in a position to say at present is that there is a good deal of clinical evidence in favour of its being a pathogenic organism.

Treatment.—The line of treatment adopted was that recommended by Lieut.-Colonel H. W. Acton. This has given fairly satisfactory results so far as the amelioration of the general conditions of the patients and the symptoms produced are concerned, but the infection is often not eradicated. The usual medical treatment with saline is given when motions are frequent and contain blood or mucus. Constipation if present is relieved and the bowels are regulated. Any associated protozoal and helminthic conditions are treated. When the acute symptoms subside or in chronic cases a course of vaccine is given, as laid down below, the injections being given twice weekly.

- 1st injection 10 millions.
- 2nd injection 20 millions.
- 3rd injection 30 millions.
- 4th injection 40 millions.
- 5th injection 40 millions.
- 6th injection 40 millions.

In some patients the reaction after an injection is severe, a rise of temperature and colicky diarrhoea being produced. If this is the case the next dose should not be increased. A mild reaction after an injection is desirable, and is beneficial. Throughout the course of injections the patients are kept on calcium lactate, 10 grains, and extract of parathyroid, 1/10th grain, twice daily. After the course of vaccines the patient is put on a general tonic consisting of iron, arsenic and strychnine. In debilitated patients with long-standing infection a change and rest to an agreeable climate is necessary. If the bowel symptoms do not completely subside a month's course of standardized liquid extract of kurchi in doses of one drachm twice daily should be given. The kurchi alkaloids have a sedative effect on the gut and increase the tone of the intestinal musculature.

The question of diet is very important. The carbohydrate in the diet, particularly such articles as rice, potatoes and sugar, should be cut down to a minimum, the diet being mostly protein. Most of the patients improve rapidly under this treatment, but in some of the chronic cases the improvement is temporary and relapses frequently occur.

Summary

1. *Bact. pseudo-carolinus* is a Gram-negative, non-motile, non-lactose-fermenting intestinal organism of the genus *Bacterium*. Further differentiation of the bacillus from other organisms of the same group is determined by

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THYROID EXTRACT IN PROSTATIC ENLARGEMENT

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LITTLE is taught in the medical schools, or even in the books dealing with the subject, about the early symptoms of prostatic enlargement until the patient comes near the catheter stage.

Enlarged prostate does not grow in a night, but is of slow growth, the process extending over several years, during which time the case is, or should be, in the charge of the general practitioner, though even he comes on the scene much later than he should do, I suppose, owing to sentimental reasons on the part of the patient.

The earliest symptom is congestion of the penis in the early morning and after a siesta indicating a call to pass water, which when passed relieves the congestion. Later on, this

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its fermenting action on carbohydrates; it produces acid and gas in glucose, and maltose and mannite. Its exact position in the classification of that genus has not been worked out.

2. There is some evidence to suggest that *Bact. pseudo-carolinus* is a phage-mutated variant form of *Bact. flexneri*. Although there is some presumptive evidence in favour of this on the clinical side, the evidence on the bacteriological side is not as yet conclusive.

3. The clinical symptoms associated with this infection have been described in detail. A study of these tends to show that this bacillus is associated with a definite train of symptoms not met with in other intestinal infections. The clinical evidence in favour of this bacillus being pathogenic is strong.

4. The general treatment adopted and the specific treatment with autogenous vaccines has been described.

We are very grateful to Captain C. L. Pasricha, I.M.S., Professor of Bacteriology, and Dr. K. Banerji for their help in this work.

REFERENCES

- Acton, H. W., and Chopra, R. N. (1929). Kurchi Bismuthous Iodide, its Value in the Treatment of Chronic Amœbic Infections of the Bowel. *Indian Med. Gaz.*, Vol. LXIV, p. 481.
- Acton, H. W., and Chopra, R. N. (1933). The Treatment of Chronic Intestinal Amœbiasis with the Alkaloids of *Holarrhena antidysenterica* (Kurchi). *Ibid.*, Vol. LXVIII, p. 6.
- Chopra, R. N., Sen, B., and Sen, S. (1933). Treatment of Chronic Intestinal Amœbiasis with Carbarsone. *Ibid.*, Vol. LXVIII, p. 315.
- Chopra, R. N., Sen, B., and Sen, S. (1934). Treatment of Chronic Intestinal Amœbiasis with Gavano, a Derivative of Ipecacuanha. *Ibid.*, Vol. LXIX, p. 130.
- Pasricha, C. L. (1931). *Annual Report, Calcutta School of Tropical Medicine for 1930*, p. 96. Bengal Government Press, Calcutta.

congestion becomes intensified constituting a prostatic erection, with a feeling radiating into the testicles. Passing water at once relieves this. The passage of water through such congestion is in a reduced stream until the erection has subsided, as would be expected. These erections are not associated with any sexual feelings, but are purely of prostatic origin. These symptoms do not indicate the need of emptying a full bladder as in youth, but the patient soon learns their indication. The frequency of micturition varies from twenty times in the night in some developed cases to once in the night in the very early stage.

There gradually develops a reduction in the size of the stream especially at the end of micturition, which as time goes on slows down to end in a dribble—practically out of control of the patient. When he has got thus far he is in, or is close to, the stage when there is some residual urine left in the bladder. The experienced surgeon when examining by the rectum will find varying degrees of enlargement. This examination should always be done. Cancer of the prostate, being one of the three largest groups of that disease, should always be under consideration in such cases. The enlarged non-cancerous prostate has a relatively soft and elastic feel whereas a cancerous one has a characteristic hard feel to the finger, which when once experienced will not easily be forgotten and is as diagnostic as the microscope. When the patient comes to the dribble stage he may on short notice need a catheter, due to a sudden more acute congestion than usual. From this stage the case is well known to every practising member of the profession.

The following case will give us a foundation of facts on which to speculate :—

Case.—A. B., a man about seventy, six feet two inches in height, normally about sixteen stone, had put on weight to over nineteen stone. His blood pressure was 156, indicating an age of fifty-six years, which, both physically and mentally, he looks like. He is organically sound in every other respect apart from the early stage of prostatic enlargement having reached the early dribble stage above noted and also having a trace of residual urine.

My first objective was to get down the weight. I administered rapidly-increasing doses of thyroid extract (Burroughs and Wellcome) until I reached twelve grains daily. Twelve grains gave the usual symptoms of an excessive dose. I fell back to ten grains daily which was tolerated well for six weeks, with every feeling of well-being. At this stage I stopped the thyroid extract for three weeks, at the end of which time he had lost over three stones in weight.

Before administering the 'thyroid' the patient had a tendency to yawn much more than is normal, but almost from the commencement of the administration the yawning ceased.

He could pass water much more freely. The dribble stage had disappeared and at the end of the course the trace of residual urine above mentioned had ceased. The prostate was perhaps somewhat smaller to the feel per rectum, but on the amount I would not be dogmatic. The prostatic congestions and erections of the penis ceased, and sexual capacity was diminished at the same time.

About three weeks after the end of the course of thyroid extract the whole pre-thyroid-extract condition—sexual, urinary and yawning—were being resumed. Four and a half grains of thyroid extract were given daily: on the fifth day there were unmistakable signs that this amount was not well tolerated and it was stopped. The symptoms had at once responded to this dose. The day after ceasing the thyroid extract, the testicles seemed softer and the softening increased for about four days. This softening was associated with shrinkage in size until their cubic capacity was reduced by twenty-five per cent. These facts were unmistakable. From this stage it took between three and four weeks for the original condition to show signs of being resumed.

One grain daily was then given; as this was not enough, it was increased to one and a half grains, and later two grains, which proved quite satisfactory. He has been on two grains for the first two months. This amount, which leaves his sexual power though reduced, presumably represents his thyroid deficiency. His feeling of well-being has increased and at present his weight is stationary though throughout there has been no change in diet or exercise.

Those of us who remember the days before Freyer commenced enucleation of the prostate remember that castration was vaunted as a remedy—but the results were not satisfactory enough to compete with Freyer. This procedure was based on the fact that eunuchs do not develop prostates. While castration before any symptoms of enlarged prostate develop, or even in the early stage of enlarged prostate, might prevent development, it could not be expected to cure it, once enlargement was in the catheter stage such as was the case with those submitted to this procedure. It might, and I think it did, relieve the congestion of the prostate and thus relieve the patient to that extent, but it could not be expected to reduce the hyperplasia existing at the time or if it did it would only be to a trifling extent.

The point which concerns me was the unanimity of opinion at that time that the cause had its origin in the testicles. I do not think that this is challenged to-day. I assume that the internal secretion of the testicles accounts for a number of things, enlargement of the prostate among them, and that the external secretion or semen is merely concerned with reproduction.

Let us now come to the case of the patient A. B. :—The complete wiping out of sexual desire and of the symptoms of enlarging prostate at the same time under the influence of the thyroid extract administered, their resumption a few weeks after cessation of its administration, and repetition of this state of affairs, with the immense reduction in the size and tension of the testicles after a second course of thyroid, demonstrates to my mind that the internal secretion of these organs is the cause of enlarged prostate. The action of thyroid extract leads definitely to the conclusion that the reason why enlarged prostate is not universal, but very far from it in the prostatic period of life, is that patients who develop enlargement are suffering from deficiency of thyroid endocrine; in short, that their thyroid and testicular endocrines are not balanced as

they are in early life, and in those who escape enlargement in later life.

I regard the difference in A. B.'s susceptibility to thyroid extract as indicating that he could carry ten grains daily till his fat was consumed down to the physiological limit after which four and a half grains was too much.

The suddenness and the extent of the improvement in the passage of urine and its prompt completion can only be explained by the complete reduction of congestion of the prostate (as well as of all the sexual organs).

When the patient was seven weeks under treatment I passed a catheter and found no residuary urine. I repeat that the whole of this case proves, as clearly as anything clinical can be proved, that prostatic enlargement is based on chronic congestion of the prostate due to want of balance between the thyroid and testicular endocrines.

Cancer of the prostate.—This is generally admitted to be the condition on about fifteen per cent of the enlarged prostates operated on; my own experience would be nearer twenty per cent. These are usually cases of long standing and are usually of under medium size and hard to the feel through the rectum, a feeling which is diagnostic. Is this cancer based on chronic irritation which is here as in many other cases associated with chronic congestion? We know that such congestion exists in the scrotum in chimney-sweeps' and cotton-spinners' cancer, etc.

Is chronic congestion the foundation on which these cancers are based, prior to the wandering of epithelial cells into mesoblastic tissue?

Let us now speculate as regards cancer of the uterus and breast. Like the prostate in the male these are parts of the sexual organs and in these organs cancer occurs after the menopause, as cancer of the prostate occurs in the corresponding period in the male. Cancer of the cervix uteri is preceded by a period of congestion followed by bleeding when it is called erosion and later on becomes cancerous. Are these cancers ultimately based on chronic congestion?

The uterus is embryologically analogous to the prostate in the male. If we have chronic congestion of the cervix uteri common why not chronic congestion of the lactiferous ducts which I assume is the seat of origin of most cancers of the breast? If so, is such congestion the foundation of these cancers?

It would be interesting in these bleeding cervixes to try treatment with maximum doses of thyroid extract and see if they are due to want of balance of the thyroid and ovarian endocrines, as in the analogous case of the chronic congestion in the patient A. B., and its control. The stakes are large and there is no risk in the experiment, but in experimenting, the maximum dose that the patient can carry must be found and the dose kept near that

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ACUTE BACILLARY DYSENTERY IN CHILDREN: ADVANTAGES OF ITS TREATMENT BY PETROLEUM AND ALLIED PREPARATIONS

By T. H. GUNWARDENE, L.R.C.P. (Lond.)
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THE writer has used liquid paraffin in the treatment of bacillary dysentery in children for a number of years, and his experience has led him to the conclusion that, provided the child has not received any preliminary purgation or other unsuitable treatment and that satisfactory nursing is available, he can now give a favourable prognosis in this serious disease of childhood.

Symptomatology.—The condition is most common in children between the ages of two and five years. The first attack of bacillary dysentery as a rule sets in with dramatic suddenness.

The first symptom is usually a rise of temperature, with chilliness or actual rigor and, in younger children, convulsions. For a few hours one is at a loss as to the cause of the temperature, chilliness or convulsions; but very soon, as a rule within six hours from the onset, vomiting, more or less severe, sets in, followed almost immediately by copious and very offensive watery motions most often without any obvious blood. Then the characteristic intermittent griping abdominal pains with nausea and more or less continuous tenesmus sets in. The tongue is, as a rule, covered with a thick fur. The stools are now watery and remain so for the first twenty-four hours or so, but later they become the characteristic, tenacious, blood-stained mucus in varying shades of green and brown due to the unaltered bile. The number of stools in a severe case, without active purgation or with only a mild aperient, is seldom less than one every half hour, if trouble is taken to change the napkin with each motion, as is usually done in private cases. The initial hyperpyrexia, which may be as high as 106°F. and accompanied by drowsiness and headache, soon settles down and for the next two or three days takes on an intermittent character. By the third or fourth day the temperature is normal, and a

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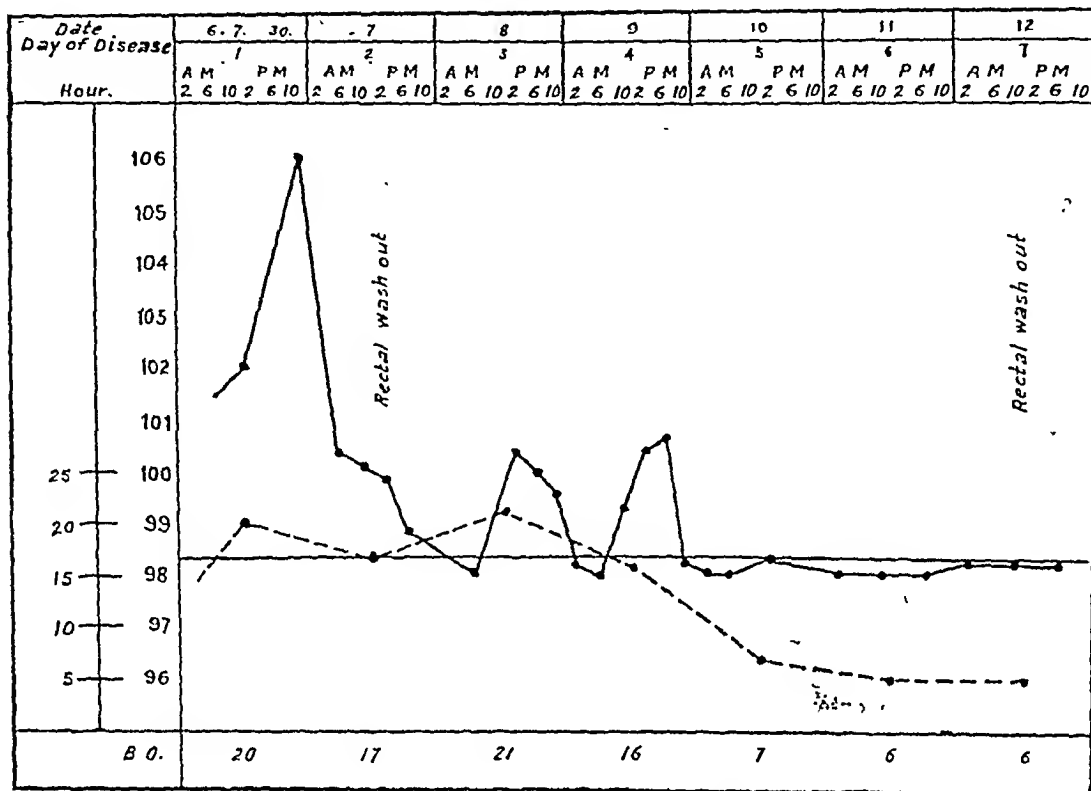
point if the experimenter is to get results. There should be no half measures. Half measures are useless in most things and in none more than in these cases.

In the case of the prostate the doctor in charge *must* get on to the case when the very earliest symptoms appear—if he is to expect maximum results. There is little use in testing this agent on an advanced prostate. The experimenter will get no more from it than was got by castration in the catheter stage.

child usually begins to take a passing interest in a toy or picture book, and one is able to pronounce the patient definitely out of danger.

Below is the temperature chart of a typical acute case in a child $4\frac{1}{2}$ years old.

and the red cells in agglomerated masses and reddish brown in colour. The presence of the macrophage cells is another characteristic feature of the bacillary stool. The mistake liable to occur is the confusing of the large



Prakarama, F., age $4\frac{1}{2}$ years, male child.

The stools are now at longer intervals and the griping pain tolerable. Such in brief is the course of the acute and anxious stage of the illness when treated with any preparation of petroleum.

Diagnosis.—Though the clinical picture is so characteristic, I have had the stools of most of my patients examined microscopically and culturally. The preliminary report has always been 'no amœbæ, cellular exudate of bacillary type present'. *Bacillus dysenteriae* is not always isolated culturally. In thirteen cases of the type described above and in which I have kept careful notes, the Flexner organism has been isolated three times, and the Shiga not at all. This is not difficult to understand, as these bacilli are rapidly outgrown by the normal intestinal flora. To the experienced pathologist however the cytological picture of the cellular exudate of a fresh stool in the early stages is sufficiently characteristic to give a definite diagnosis for practical purposes. The polymorphonuclear leucocytes and pus cells to the extent of nearly 90 per cent intermingled with unaltered red blood corpuscles, as isolated cells or in normal rouleaux formation, present a different picture to that of the amœbic stool, where the pus cells are scanty and degenerated,

Dotted line indicates number of stools.

endothelial macrophages, with their ingested red blood cells and leucocytes, for vegetative forms of *Entamoeba histolytica*. One has also to bear in mind the possibility of a double, bacillary and amœbic infection. Personally, I have never diagnosed this double infection in a child.

Prognosis.—Having had no deaths amongst cases that I have treated from the commencement of the illness, I invariably give a good prognosis. I am extremely guarded, however, when a case comes to me after initial purgation either with castor oil or sulphates or when opiates have been given as indicated by pinpoint pupils. In either case, depending on the degree of dehydration present as a result of the purgation or the degree of drowsiness as a result of the narcotic, I refuse to give a prognosis until 24 or 36 hours have elapsed. In these cases one can hope to overcome dehydration within this time, but the drowsiness, if marked, practically never, even in older children.

Treatment recommended.—I have never been convinced of the need for inducing active purgation in the case of a child whose abdominal contents nature is actively attempting to clear, whether we like it or not, in the course of the next twelve to twenty-four hours, by vomiting

at one end and purging at the other. It may be that adults, unlike children, can withstand such treatment, and that dehydration does not set in as rapidly as in children. The vomiting that is present, and the nausea that follows prevents us from making good orally the loss of fluid that is taking place as a result of the continuous diarrhoea, and to purge further such a child is to dehydrate him to such dangerous degrees as to necessitate subcutaneous or intraperitoneal salines. There is yet another danger of active purgation that children risk more than adults, and that more in private than in hospital practice. The child unlike the adult may not call out for water to satisfy its thirst, and may thus be deprived of what it needs most. Though a trained nurse may be impressed with the necessity for water, not so an unintelligent parent or relative, and it is particularly under such circumstances that active purgation produces the most fatal results.

The suggestion for treating acute bacillary dysentery in children without active purgation but with the use of a lubricant, such as petroleum, is based on scientific principles and practical experience. I am inclined to believe that the view, widely prevalent amongst the public and some medical men, that ayurvedic treatment is better in dysentery than western methods, is in great part due to the active purgation resorted to by us, and to some extent to the injections so freely administered as a routine, without taking into consideration the type of dysentery present.

The form of petroleum I most commonly use is Nujol in the case of smaller children, and Hydrolax in older children. The choice is made because Nujol, being less viscid, is more easily made into a palatable emulsion with a small quantity of water. My usual prescription, for a child two years of age, is :—

R			
Sodii bicarbonatis	..	..	grs. 5
Nujol	..	..	drachm $\frac{1}{2}$
Tincturæ cardamoni compositæ	..	..	min. 10
Syrupi zingiberis	..	..	min. 10
Mucil. tragacanthæ	..	..	q. s.
Aquam anæthi	..	..	ad drachm ii.

Even larger doses can be given with safety and great advantage. This I give every two hours when the child is awake, for the first twenty-four to thirty-six hours, and when the motions become less frequent, the tenesmus less severe, and the child free of fever and tolerably happy, I give larger doses at longer intervals. Paraffin is continued to the very end of the illness, and when the motions become still fewer I wash out the bowel once or twice a day. The washing out of a bowel that is so thoroughly lubricated is a simple procedure and often so free of discomfort that children not infrequently fall asleep during the process. I have gradually abandoned the washing out of the bowel in the early stages, but take great care to wash out later if there is any tenesmus and the stools

are less than three in number. The most important stage at which to wash out the bowel is about the seventh day when the stools are beginning to take on an offensive odour due to the putrefaction of the sloughs. Such a course would also prevent the secondary rise of temperature that sometimes occurs due to retarded elimination. That paraffin acts mainly as a lubricant and not as a purgative is definitely seen by the stools becoming gradually less by about the fourth day, in spite of the continued administration of paraffin.

Intestinal antiseptics I never or seldom use, unless one looks upon petrolcum itself as an antiseptic. I am not prepared to support the statement that petroleum is a 'powerful antiseptic', still one cannot blind oneself to the fact that it does in some degree limit and retard the decomposition of intestinal contents. We know from experience that the stools of persons who regularly take paraffin are, if not actually odourless, at any rate less offensive than when oil is not taken. This may partly be due to the rapidity of transit of the food, but I feel convinced that it acts as an antiseptic to some extent by coating either the bacteria or the nutrient on which they thrive, with an impenetrable film of an indifferent oily substance which is thus prevented from mixing with or becoming incorporated in the protoplasmic contents of the living or the dead cells.

Anti-serum treatment.—Byam and Archibald (1922) state that anti-serum is of *no value* in the Flexner infections as the toxin of the Flexner bacillus is an intracellular one. Serum is of use in Shiga infections only. Acton and Knowles (1928) state that 'infection with the Flexner bacillus is eighteen times as common as infection with Shiga'. On inquiry at the Colombo Municipal Laboratory I am informed that they have not isolated the Shiga bacillus more than four times in the last ten years. Still, if one must administer serum it behoves one to keep in mind that 'serum sent out to the tropics in cold storage rapidly loses its potency in transit and storage'. How much more so must it be in Ceylon where up to very recent times only one firm of chemists possessed an ice chest for storage purposes. Partly for these reasons and mostly because patients receiving my mode of treatment progress so favourably and appear to be free from any severe toxæmia, I refrain from causing even that amount of pain which a serum injection gives rise to, in an already suffering child.

Tenesmus and abdominal pain.—This I am always successful in relieving considerably by attending to the wash out of the bowel myself, and by thorough application of warmth to the abdomen. It is on very rare occasions that I resort to opiates, and then I use tinctura camphoris compositæ administered apart from other medicines, so many drops so many times a day.

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CILIA IN THE ANTERIOR CHAMBER AND TRAUMATIC CYST IN THE IRIS

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TRAUMATIC punctured wounds of the eyeball give rise to a large number of important pathological conditions, both immediate and remote, and among the latter are two very rare and interesting sequelæ which, when they occur, deserve recording, *viz.*, the growth of cilia in the anterior chamber and the development of a cyst in the iris.

M. R. B., a Parsee boy, aged 12, received on the 2nd April, 1927, a severe injury to his right eyeball due to the bursting of a soda-water bottle. A small piece of

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Diet.—Until the child is relieved of all its symptoms and the stage of food craving arrives, which is usually on about the sixth day, I only allow water in abundance, porree* and fried rice cunjee (not arrowroot), weak coffee, weak tea, lemon squash, and sugar candy. To young children who refuse these, lemonade can be given. Before introducing milk I usually allow bread, and later rice and some weak chicken broth.

Summary

1. Considering that it is mucus that nature secretes in abundance in dysentery, it would appear that administering liquid petroleum is the nearest aid to nature.

2. Children so treated from the beginning to the end of the illness show marked improvement sooner than when treated by active purgation. They never get into the extreme restless and anxious state in which dehydrated children are always seen.

3. No intestinal antiseptics are needed, as petroleum acts sufficiently as an antiseptic.

4. Owing to efficient lubrication, intestinal distension practically never occurs; if it does occur, a bowel wash out is easier to administer and the result is more satisfactory than if there has been no lubrication.

5. Flooding the intestinal canal with petroleum appears to relieve adequately the irritation and consequent tenesmus, so that the need for opiates, or other antispasmodics and rectal wash outs, is reduced to a minimum.

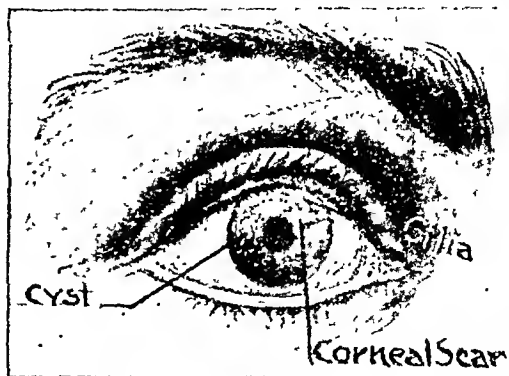
REFERENCES

Acton, H. W., and Knowles, R. (1928). *On the Dysenteries of India*. Thacker, Spink & Co. (1933), Ltd., Calcutta.

Byam, W., and Archibald, R. G. (1922). *The Practice of Medicine in the Tropics*, Vol. II. Henry Frowde and Hodder & Stoughton, London.

*Poree cunjee is cunjee water made out of fried paddy.

glass flew into his eye and caused a punctured wound of the cornea. On examination the eye revealed an oblique penetrating wound of the cornea about three millimetres in size situated at the upper and inner portion of the cornea and about two millimetres



within the periphery. The margins of the wound were a little swollen and slightly gray. The pupil was distorted and a small brownish-black mass was seen between the edges of the wound causing a prolapse of the iris. The anterior chamber contained a small blood clot and was very shallow on account of the escape of the aqueous, and the intra-ocular tension was low. In punctured wounds such as these the fate of the eye depends upon infection—whether primary, introduced at the time of the injury, or secondary in nature, by extension from the conjunctival sac which is seldom sterile. The eye and adnexa were carefully cleaned, the lachrymal sac was examined and found normal. After local anaesthesia, the conjunctival sac was irrigated with 1 in 5,000 perchloride of mercury lotion, and an attempt was made to draw the iris out of the wound, excise it on the stretch and replace it by freeing it from the wound. The wound was cleaned by touching it with the twisted end of a tiny cotton swab dipped in tincture of iodine, atropine was instilled, and the eye was bandaged. On the next day there was some severe injection, both conjunctival and ciliary in nature, the iris appeared inflamed and muddy-looking, and the pupil had only slightly responded to atropine below and to the outer side of the wound. Some exudation was also noticed in the anterior chamber and the lens had become hazy owing to the injury having involved its capsule also. Atropine was continued, blue ointment prescribed for rubbing on the temple, and potassium iodide and mercury to be taken internally. The lens gradually became opaque and cataractous due to the permeation of the aqueous inside the capsule. In course of time the injection grew less and less, the exudation disappeared, the wound healed up, and the anterior chamber was re-established, but it was unequal in depth as the upper and the inner part of the pupil had formed a synechia with the upper lip of the wound and was drawn forwards. The rest of the pupil was fairly dilated and free. The haziness of the lens was now replaced by its complete opacity, the lens matter looked swollen and soft, and undergoing slow and spontaneous absorption due to the permeation of the aqueous inside its capsule. About the 14th May, the eye became sufficiently free from the tenderness and injection, and on the 26th May needling of the remnants of lens matter was performed and the capsule in the pupillary area was divided and it gaped open fairly well. Four weeks later the pupil was nice and black, and with the scar of the corneal opacity and the distorted pupil his vision came down to 6/36; later on this improved to 6/12 with (+10 d. sphere +2 d. cyl. 20 down in)

glasses, in about six weeks' time.

Nothing was seen of him for about twelve months when he again came up with the history that every

now and then the eye got red, and after two or three days the redness disappeared.

On examination the injured eye revealed a trace of ciliary injection and appeared irritable to examination. The scar of the cornea appeared as having two wings and a centre. There was an anterior synechia underneath the inner wing, and the upper and the inner part of the pupillary margin was adhering to the centre of the scar. Beneath the outer wing of the scar, and taking their origin from it, there were four cilia lying in the anterior chamber. Two were lying stretched on the iris and the other two seemed to have a common origin and to be closely applied to each other near the roots, and to diverge towards the ends. The longer one ran obliquely over a small cyst situated in the iris right up to the periphery of the cornea. The surface of the hairs did not appear smooth and the pigment on them was worn out near the roots and that made them look bleached and grayish. The cyst in the iris was situated in its upper and outer quadrant, appeared hard, and was quite separate from the hair roots. The front aspect of the cyst presented a very thin atrophic web-like wall of iridic tissue underneath which was the grayish shining wall of the cyst. The cyst bulged forwards anteriorly but had not yet touched the cornea nor reached its periphery. The situation was carefully explained to the boy's parents and they were advised to have the cyst and cilia removed to prevent the contingency of future developments arising in the eye, but they remained adamant and desired to leave the eye alone.

30th May, 1933.—Patient sought admission into the hospital nearly six years after the first injury. The history of the case was that there was gradual diminution of vision of the right eye during the last two years without any pain or trouble and that for the past six months the eye was blind and painless. For the last week he had had troublesome vomiting and severe headache accompanied by violent pain in the eyeball and around the orbit.

On examination the eye revealed all the signs of secondary glaucoma. The eye was extremely injected, the cornea hazy and the anterior chamber of unequal depth—being very shallow in the upper half. Four hairs were noticed in the upper part of the anterior chamber. The bulging cyst in the iris tissue had rendered the latter very thin like a cobweb, and both the cilia and the cyst were nearly in contact with the posterior surface of the cornea. The pupil was dilated and fixed and the tension was raised to 50 millimetres measured with Schiötz's tonometer. There was neither projection nor perception of light. It was decided to remove the hairs and the cyst and to relieve the pain without sacrificing the eyeball.

Under local anaesthesia an incision was made in the upper part of the cornea and a long bridge of conjunctiva was kept. From under the bridge all the four hairs were removed from the anterior chamber. The cyst was gently grasped with iris forceps and removed from the thinned cobweb-like iridic tissue and an iridectomy was also done. Recovery after operation was uneventful and the eye soon became quiet and free from pain. Subsequently, it was found that there was a detachment of the retina, which was the cause of the failure of the vision, and that the secondary glaucoma was a superadded temporary condition which was relieved by the operation.

The development of cilia in the anterior chamber and of the cyst in the iris are equally rare and interesting. The causal relationship which exists between traumatism and tumour in general surgery holds good, though to a lesser degree, in the case of the eye and manifests itself in the development of these conditions. Traumatic cysts of the iris are, for the purpose of description, best divided into iris cyst proper

and iris-chamber cyst, i.e., those situated partly in the iris and partly in the anterior chamber. It is with the former class of case that we are concerned in the present instance. In cases of punctured wound of the cornea, pieces of surface epithelium get detached, are dragged in and become implanted on the iris, and, getting well nourished there, proliferate and form cysts. They may occur either as small solid pearl-like tumours, composed of concentric layers of flattened cells, or on the other hand the central cells may undergo cystic degeneration and form an epithelium-lined tumour known as an implantation cyst. The latter being the commoner of the two, it occurs as a grayish looking small flat cystic tumour situated in the iris; the wall formed by iridic tissue is clearly seen with the magnifying lens, the contents being sometimes clear, sometimes turbid fluid. More often these cysts continue to grow and then symptoms of irritation of the eye, iritis, iridocyclitis and a rise in the intra-ocular tension occur. The growth may take place forwards and when it comes in contact with the posterior surface of the cornea, the latter becomes opaque. When it grows backwards the lens may be tilted and pressed upon, and may become opaque, and when it becomes enlarged secondary glaucoma may arise. The first variety, viz, the pearl cyst is much rarer than the other, and in this case the tumour appears not so soft and cystic, but fairly firm and pultaceous, and gives the shining lustre of mother-of-pearl from which it derives its name. The pathogenesis of these varieties of cysts has been variously interpreted. The epithelium from the cornea or the conjunctiva gets dislodged by the injury causing a perforating wound and is carried into the tissue of the iris which is of mesoblastic origin and devoid of glands or epithelium and it subsequently proliferates and forms the cyst. Another theory, known as the extension theory of Stölting (Fuchs, 1923), is that during the process of healing the cells of the surface epithelium, not content with growing anteriorly, may grow and migrate into the wound, then spread over and into the tissue of the iris exposed in the area, and there proliferate and form a cyst for which they have an inherent tendency. De Wecker states that these cysts are due to sacs formed by folds of iris tissue and filled with aqueous, by the iris tissue being split by laceration or hæmorrhage, or by small foreign bodies getting lodged in the iris and, on account of the inflammation set up there, becoming lined with epithelium. With regard to the pearl cysts, which are sometimes associated with cilia in the anterior chamber, the explanation is that the epithelial cells of the hair bulbs of the eye lashes get torn, are carried by the penetrating blow into the anterior chamber, get transplanted in the iris, proliferate there, and form the cyst.

(Continued at foot of opposite page)

ANTI-TOXIC IMMUNITY TO DIPHTHERIA AMONG A GROUP OF INDIANS IN NAINITAL DISTRICT, U. P., INDIA, AS EVIDENCED BY THE SCHICK TESTS

By A. N. DAS, M.B., B.S., D.P.H., DR.P.H.,

Medical Officer of Health, Benares City, India

(Late Chief Medical Officer, Tarai and Bhabar Government Estates, Nainital)

DIPHTHERIA as an epidemic disease is comparatively infrequent in tropical countries. There is evidence, however, that the disease is endemic in India and in other equatorial zones.

From studies made in a number of countries, the epidemiology of the disease has become more easily understood than before. Certain features may, therefore, be now fitted into the epidemiological conception of this and other similar diseases. For example, it is known that diphtheria is more concentrated among children under four years of age in tropical than in temperate countries. Thus Doull (1928) gives the proportions of deaths in the 0-4 years age group to the total at all ages as 45.55 per cent in England and Wales during 1919 to 1920, as 71.99 per cent in Italy during 1915 to 1921, 60.91 per cent in London during 1910 to 1919, 71.58 per cent in New York during 1917 to 1924, 80.95 per cent in Rio de Janeiro during 1908 to 1916 and as 91.79 per cent in Manila during 1917 to 1924.

(Continued from previous page)

With regard to the origin of the cilia in the anterior chamber the most plausible explanation is that they must have been driven inside the anterior chamber at the time of the injury. This view is hard to accept in this case as the eye was carefully examined several times, before, at the time of and after the operation. There is no recollection, however, that the lid margins were specially examined for the purpose of ascertaining whether any cilia were torn away from them or not, on the first day of the injury.

O. L. Sharpe (1925) in a review of this subject states that 75 such cases have been reported within the last 100 years. The period of time these cilia remained inside varies immensely, from some months to 33 years; in my case it was about 5 years. For some time the cilia cause no trouble or symptoms, but eventually symptoms of irritation and later on of inflammation in the eye arise—such as the feeling of a foreign body, ciliary injection, photophobia, lachrymation and pain. Purulent inflammation of the globe may also occur, but it is rare.

REFERENCES

- Fuchs, H. E. (1923). *Textbook of Ophthalmology*, p. 699. J. B. Lippincott Company, Philadelphia.
 Sharpe, O. L. (1925). Cilia in the Anterior Chamber. *Amer. Journ. Ophth.*, Vol. VIII, p. 301.

Results of the Schick tests done in some tropical countries, in Manila by Gomez, Navarro and Kapauan (1922), in the Federated Malay States by Fletcher (1927), in Rio de Janeiro by Doull, Ferreira and Parreiras (1927) and in India by Rambo (1929), indicate that, at corresponding age periods, anti-toxic immunity to diphtheria is more common among the residents of these places than among those of England or the United States. Significantly enough, however, carriers of virulent diphtheria bacilli have been found to be quite as common by Vardon in India (1923) and by Gomez and Navarro in Manila (1923) as in the temperate climates.

Age distribution of diphtheria cases has been known to vary also with the aggregation of population: it is concentrated in the younger age groups more in the cities than in the rural areas.

The statistics, therefore, show that diphtheria as an infection is quite as prevalent in the tropical or sub-tropical countries as in the temperate, but that as a disease it is less prevalent and is more concentrated in early childhood. This would indicate that host-parasite relationship is more advanced, approaching closer to commensalism, in the tropical than in the temperate zones, the ratio of clinical diphtheria to immunizing infections being lower in the former than in the latter. In other words, sub-clinical infections are more common in the tropics than in the colder climates.

With a view to finding out the status of anti-toxic immunity against diphtheria in an unselected group of Indian children in Nainital district which lies on the foot-hills of the Himalayas in latitude 28° to 29°N. it was decided to perform the Schick tests.

Diphtheria toxin was imported for the writer by Messrs. Mulford and Co. from the U. S. A. For control tests the heated toxin was also imported by them. The tests were read both at the end of 24 hours and 4 days. The pseudo-reactions were classed as negative, unless accompanied by positive reactions as well. The following table gives the results of the tests done in the months of March and May 1933:

Age group (in years)	Total tested	Per cent positive	REMARKS
0-4	17	47.1	Four cases in which results were not known have not been included.
5-9	150	12.7	
10-14	81	4.9	
15-19	13	0.0	
20 and over	23	4.3	
TOTAL ..	284	11.2	

This table shows that susceptibility to diphtheria rapidly decreases with advance of age.

Clinical cases of diphtheria in these parts of the country are almost unknown among Indians; the writer saw only one case of diphtheria during the five years of his stay in Nainital district. It is not, of course, suggested that this was the only case that occurred from the disease during that period. It does appear, however, that the probable explanation of the phenomenon is that sub-clinical infections of the disease are quite common.

Frost (1928) while discussing the epidemiology of diphtheria stated that ratios of infection to immunity and of infection to disease vary widely, in the same population, with age, race, circumstances of known exposure, and, in different populations, with difference in latitude. Certain unpublished studies made by the writer on acute poliomyelitis, a disease epidemiologically very similar to diphtheria, seemed to suggest that these ratios may vary in the course of the same epidemic. Statistics are available on the results of Schick tests done in India on Indians by Rambo (1929) and on Europeans and Anglo-Indians by Fox, McDonald and McCombie Young (1923). These are given below :

RAMBO'S STATISTICS		FOX'S <i>et al.</i> STATISTICS	
Age group	Per cent positive	Age group	Per cent positive
Under 3 years	72.2	1-5 years	54.5
3-6	10.7	5-10 "	51.5
7-10	14.0	10-15 "	41.6
11-14	2.6	Over 20 "	66.6

These statistics indicate that, age for age, the Anglo-Indians and Europeans have a higher susceptibility to diphtheria than Indians. The results are similar to those obtained in the U. S. A. where the white population have at corresponding ages a greater susceptibility than the coloured.

There were only four pseudo-reactions noticed by the writer among Schick tests made. Rambo had 2 such among 197 cases, whereas Fox *et al.* had 12 pseudo-reactions among 271 tests done on Anglo-Indians and Europeans. These reactions have been ascribed to local anaphylactic response to the protein of auto-lysed diphtheria bacilli in the broth. The statistics at our disposal are inadequate, but if the figures indicate a general law regarding racial variation, some explanation will have to be sought for the phenomenon. The question will then be: How do the Europeans and Anglo-Indians get sensitized to the diphtheritic protein to a greater degree than do the Indians?

Summary

1. There are reasons to believe that diphtheria is endemic in India.

2. The morbidity from diphtheria is, for some obscure reason, not high among Indians.

3. The susceptibility to diphtheria rapidly decreases with advance of age in this country, in spite of the fact that as a disease it is not so prevalent. This suggests that infections incapable of producing clinical manifestation of disease are common.

4. More extensive Schick-testing among various races in India are required to elucidate certain important phenomena of the disease.

Acknowledgments

Acknowledgment is here made of the help given by Dr. B. S. Bisht, L.M.P., L.P.H., in conducting this study and by the Tarai and Bhabar Government Estates in financing the investigation.

REFERENCES

- Doull, J. A. (1928). Variations in the Age Distributions of Mortality and Morbidity from Diphtheria, Scarlet Fever and Certain Other Diseases in Relation to Latitude. *Amer. Journ. Hyg.*, Vol. VIII, p. 633.
- Doull, J. A., Ferreira, M. J., and Parreiras, D. (1927). The Results of the Schick and Dick Tests in Rio de Janeiro. *Journ. Prev. Med.*, Vol. I, p. 513.
- Fletcher, W. (1927). Notes on Diphtheria in the Federated Malay States. *Bull. Inst. Med. Res., Federated Malay States*. No. 2.
- Fox, E. C. R., McDonald, E. J. C., and McCombie Young, T. C. (1923). The Schick Test and Immunization by Toxin-Anti-Toxin in Assam. *Indian Med. Gaz.*, Vol. LVIII, p. 419.
- Frost, W. H. (1928). Infection, Immunity and Disease in the Epidemiology of Diphtheria, with Special Reference to Some Studies in Baltimore. *Journ. Prev. Med.*, Vol. II, p. 325.
- Gomez, L., and Navarro, R. (1923). Diphtheria Carriers and their Significance in the Philippines. *Philippine Journ. Sci.*, Vol. XXII, p. 559.
- Gomez, L., Navarro, R., and Kapauan, A. M. (1922). The Schick Reaction in Filipinos. *Ibid.*, Vol. XX, p. 323.
- Rambo, V. C. (1929). The Response of a Group of Indian Infants and Children to the Schick Test. *Indian Med. Gaz.*, Vol. LXIV, p. 145.
- Yardon, A. C. (1923). Diphtheria Bacillus Carriers in a Mixed Indian Population. *Indian Journ. Med. Res.*, Vol. XI, p. 611.

A Mirror of Hospital Practice

TOXIC EFFECTS OF EMETINE ON THE CARDIOVASCULAR SYSTEM

By R. N. CHOPRA, C.I.E., M.A., M.D. (Cantab.)
LIEUTENANT-COLONEL, I.M.S.

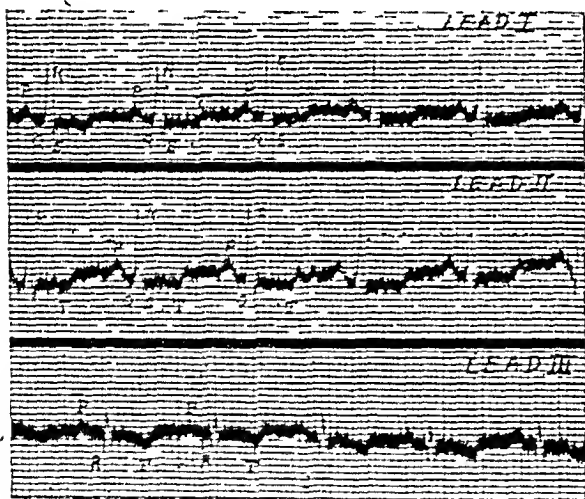
and

B. SEN, B.Sc., M.B.

(Carmichael Hospital for Tropical Diseases, School of Tropical Medicine, Calcutta)

S. D., a European female, 48 years old, was admitted into the Carmichael Hospital for Tropical Diseases, under the senior author on 23rd January, 1934, with irritation of the skin all over the body and a general feeling of weakness, depression and debility. The patient suffered from malaria five years ago and was treated with quinine. A year later she had an attack of acute amoebic dysentery and was treated at the School of Tropical Medicine, London, where a large number of *Entamoeba histolytica* were found in her

stools. The treatment consisted of a course of emetine-bismuth-iodide by the mouth lasting for 12 to 14 days, the drug being taken every night in gelatine capsules. The first two doses were vomited, and after six doses of the drug, the patient's pulse became rapid, she felt extremely weak and was consequently kept strictly confined to bed for a week. The symptoms of dysentery disappeared, but the rapid pulse and general weakness persisted, at the time of her discharge from the hospital. She regained her normal health in about a month. The patient returned to India and during the hot weather of 1933 had another attack of malarial fever and was treated with quinine. Soon after this she started passing blood and mucus with her stools, and on examination these showed *E. histolytica*. She was put on emetine, one injection daily for the first six days and after that one every alternate day till a total of nine injections had been given. After the ninth injection, although the symptoms of dysentery disappeared and examination of the stools showed no *E. histolytica*, the patient's pulse became very rapid, she felt very weak physically, was mentally depressed, and had an itching sensation on the skin all over the body which was very uncomfortable. The patient was kept in bed and put on a mixture containing digitalis which she took for about three weeks. The rapid pulse and the general depression however persisted, she could not undertake any physical exertion, and she lost weight. She came to the Carmichael Hospital for Tropical Diseases for investigation and treatment.



The patient on admission was thin, anæmic and debilitated, and complained of a feeling of exhaustion. Physical examination revealed a rapid pulse (90 to 100 p.m.) of low tension, the heart sounds were weak and flabby, and the blood pressure was 106 m.m. systolic and 70 m.m. diastolic. The urine showed no albumin or any other abnormal constituents. There was a good deal of itching of the skin, but no patches of urticaria were visible. Repeated examinations of her stool showed neither protozoa nor any non-lactose-fermenting bacteria. No helminthic ova were found and no malarial parasites could be detected in the peripheral blood; culture for the plasmodium was also negative. Electrocardiographic examination was made soon after admission with the following results:—

P-R interval—0.10 secs.

P-T interval (systole)—0.35 secs.

T-P interval (diastole)—0.24 secs.

Heart rate—104 per minute, regular.

Potential of R wave—1.2 multivolts.

Inversion of T wave in second lead with T-P interval (diastole) less than P-T interval (systole) indicates myocardial damage with tachycardia of sinus origin.

The interesting points about this case are the toxic effects produced by emetine on two occasions when the drug was administered for intestinal amœbiasis. On both occasions the main effects were on the cardiovascular system. The author and his co-workers (1924) showed that marked histological changes of a degenerative character occur in the heart of rabbits after injections of emetine. In this patient the indications of myocardial changes were clearly demonstrated by electrocardiographic tracings. Emetine also has a damaging action on the capillaries, and the senior author has seen several cases in which itching of the skin and even urticaria and large pruriginous plaques were produced and persisted for a month, after a course of emetine. The patient improved with cardiac tonics (iron, arsenic and strychnine), and an electrocardiogram taken three weeks later showed a distinct improvement.

REFERENCE

Chopra, R. N., Ghosh, B. M., and De, P. (1924). Toxicity of Emetine. *Indian Med. Gaz.*, Vol. LXI, p. 338.

A CASE OF CEREBRO-SPINAL FEVER SUCCESSFULLY TREATED BY INTRAVENOUS INJECTIONS OF UROTROPINE

By B. L. CHOPRA, L.R.C.P., L.R.C.S., L.M., D.P.H.
D.T.M. (Liverpool)

District Medical Officer, North Western Railway
Delhi

A MAN, 35 years of age, was admitted into this hospital about the first week of December 1933 with a temperature of 103°F. He was examined and found to have Kernig's sign and all other clinical signs of cerebro-spinal fever.

A lumbar puncture was done and about 30 c.cm. of turbid fluid, flowing at slightly increased pressure, were drawn off. This was examined bacteriologically and showed meningococci in abundance. Next day another lumbar puncture was done, 30 c.cm. of fluid drawn off and 20 c.cm. of anti-meningococcal serum injected intrathecally. Next day another lumbar puncture was done, and the same amount of fluid was drawn off, and 20 c.cm. of anti-meningococcal serum was injected. As the serum was not having much effect on the temperature and general condition of the patient, daily intravenous injections of urotropine (5 c.cm. of 40 per cent solution) were given. The first injection brought the temperature down and it remained normal throughout the remaining period of his stay in hospital, except on one or two occasions when it was about 99°F.

Twelve intravenous injections of hexamine were given in all. Each injection seemed to improve his condition. Whenever he complained of headache and uneasy feeling a lumbar puncture was made and about 30 c.cm. of fluid removed each time. Five such punctures were made.

On the 31st December (25th day of disease) the patient complained of pain in his joints and looked slightly toxæmic with a temperature of 98.8°F. An intravenous saline (half a pint) was administered and after that day he made an uneventful recovery and

was discharged cured on the 18th January when the cerebro-spinal fluid was found to contain no meningococci.

My thanks are due to the Chief Medical and Health Officer, North Western Railway, Lahore, for permission to publish this article.

VOLVULUS IN A NEWBORN CHILD*

By M. A. H. SIDDIQI, M.S., F.R.C.S. (Eng.)
Professor, Anatomy Department, King George's Medical College, Lucknow

A CHILD, apparently normal, exhibited restlessness and appeared to be in pain on the third day after birth, and on the following day it died. As there was no obvious cause for death a post-mortem examination was performed.



When the abdomen was opened an extremely distended loop of small intestine, deep green in colour, presented in the opening. There was no effusion of fluid in the peritoneal cavity and all the other organs appeared normal.

The distended loop of bowel filled the iliac and lumbar regions on the right side and it was found to be a portion of the ileum about eight centimetres from the ileo-cæcal junction which had been strangulated by an anti-clockwise twist of ninety degrees on a mesenteric axis four and a half centimetres in length.

This case is of interest because volvulus in such a young child is very uncommon, and the direction of the twist was in the opposite direction to that usually seen. The absence of peritonitis is probably explained by the early death of the child and the relatively sterile condition of the intestinal contents at this early age.

* Rearranged by Editor.

A CASE OF STRANGULATED HERNIA RELIEVED BY ATROPINE

By A. R. LODHI, M.B.S., B.M.S.
Medical Officer In-charge, Pandit Dispensary, Sirsi

A MALE patient, R. V. M., aged 57 years, was admitted with a strangulated hernia on the 11th January, 1934.

His temperature was 97°F., pulse 100 p.m., weak and of low tension. He had vomiting, colicky pains and cold perspiration. The inguino-scrotal swelling, which had lasted for six hours, was spheroidal in shape, size about 6 inches by 5 inches, had no impulse on coughing and was tense, tympanitic and irreducible.

An enema, and cold and evaporating lotions were tried before arrival at the dispensary without any good result.

Atropine 1/50 grain was injected hypodermically and was repeated after half an hour, as the first injection had no effect. After one hour and a quarter, the swelling became soft and was reduced gradually by taxis.

A truss was put on as the patient refused to undergo an operation for radical cure.

REMOVAL OF A FOREIGN BODY FROM THE ŒSOPHAGUS

By JAGDISH LAL KAPOOR, B.Sc., M.B.S.
Chief Medical Officer, Faridkot State

A boy aged about 7 years was brought to the hospital by his father with the history that he had swallowed a piece a week ago. The boy did not complain of any pain, nor was there any difficulty in breathing or swallowing.

The father was certain that the piece had not been passed out. The child was having a slight rise of temperature, he had anorexia and there was a slight tinge of jaundice in the eyes.



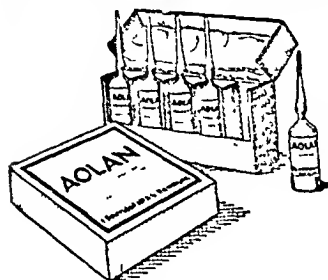
On screening, the coin was seen at the root of the neck, just above the sternal end of the right clavicle, a little to the right of the mid-line with the flat surface antero-posteriorly.

Under general anaesthesia, with a little manipulation, the piece was removed with a coin catcher.

It is remarkable that the coin could remain in the œsophagus for seven days without any symptoms, the child taking his ordinary food daily during the week.

My thanks are due to Dr. Sucha Singh, Radiologist, Harendra Hospital, Faridkot, for his assistance in the case.

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Indications	Method	Dose	Interval	Remarks
1. Furunculosis, carbuncles, abscesses, suppurating ulcers, trichophytia (especially deep tr. with infiltrations), pyoderma, tinea, kerion (celsi), folliculitis	Intramuscular	10 c.c.	5-6 days	In trichophytosis and furunculosis, treatment should be continued after improvement; 1-2 injections of 10 c.c. at intervals of 2-3 weeks to prevent recurrence.
2. Eczema, dry and oozing	(a) Intradermal (b) Alternately, intradermal and intramuscular See (2-b)	3-5 c.c. 2 wheals 5-8 c.c. 2 wheals	4-5 days 3-4 days	If the local reaction after intramuscular injection is intense (sometimes observed in extensively affected areas), dosage should be decreased
3. Acne vulgaris	Intramuscular	10 c.c.	5-7 days	
4. Ulcers of the leg				
5 Gonorrhea and its complications: (a) Acute gonorrhea of the posterior urethra.	Alternately, intramuscular and intradermal	10 c.c. 2 wheals	3 days alternating	Clears the urine after a few injections (in acute Gonorrhea of the anterior urethra, Aolan (intramuscularly) will prevent complications.
(b) Chronic gonorrhea in the male without complications.	Alternately intramuscular and intradermal	10 c.c. 2 wheals	3 days alternating	

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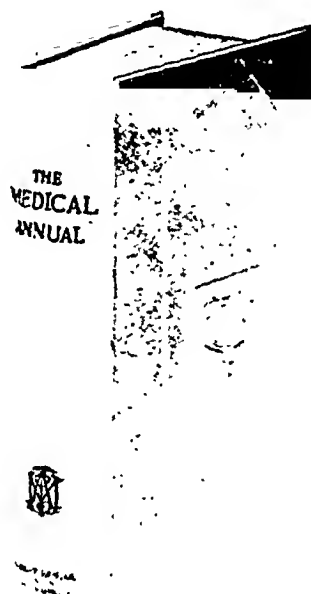
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Indian Medical Gazette

MAY

THE PHARMACEUTICAL PROFESSION AND THE 'DRUGS SCANDAL'

THE medical profession is not entirely self-contained and independent; certain other subsidiary professions have an important bearing on its successful conduct. One of the principal of these subsidiary professions is pharmacy, because no matter how skilled a medical man be in the diagnosis of his case this comes to naught if the drugs he prescribes are not accurately and honestly dispensed.

The unsatisfactory condition of the profession of pharmacy in India as a whole has been fully established and the facts published in the report of the Drugs Inquiry Committee in 1931, and recommendations for improving, and to some extent standardizing, the educational status of pharmacists throughout India are fully discussed therein, and have since been the subject of editorial comment in these columns, so there is little new to be written regarding this important subject, but we feel that a reminder will not be out of place. It would be most unfortunate if the valuable work of the Drugs Inquiry Committee were to go the way of most committee and commission reports and become forgotten in some inaccessible pigeon-hole.

In another part of this issue we publish the presidential address to the All-Bengal Compounders' Association, delivered recently to them by Lieutenant-Colonel Chopra, C.I.E., I.M.S., who was, it will be remembered, chairman of the Drugs Inquiry Committee, and perusal of this address will show that he at least is doing his best to keep before the pharmaceutical profession and the general public the urgent necessity for raising the former's status throughout the country.

Although it has been demonstrated beyond the possibility of doubt that the education and qualifications of pharmacists and dispensers is deficient in every province in India, the other factor, namely, the impurity and adulteration of drugs, which was the *raison d'être* of the Drugs Inquiry Committee and has recently been attracting the attention of the public press in this country, must be countered by legislation and an improvement in the regulation of the sale of drugs effected at the same time, otherwise simply raising the standard of pharmacists by itself can produce little benefit to the public; it is essential that in these two instances any advances must be made side by side.

The *Statesman* recently devoted a leading article to the subject of impure and adulterated

drugs, and during the past few weeks there have been several reports from Bombay and Madras of public protests on the subject of the 'drugs scandal', as it has not inappropriately been called. These were followed by a letter and a short editorial comment in the *Civil and Military Gazette* of 5th April.

In the present state of the law it is apparently very difficult to take any legal action, even in the face of the most blatant instance of dishonesty.

Only a few days ago a circular, addressed to 'Presidents of Union Boards' but in this instance sent to a medical officer of a group of tea estates, came into our hands. The impression was conveyed that the originators of this circular were a philanthropic society who were prepared for the sake of the 'indigent and helpless victims of malaria' to supply quinine at a reduced price. Quinine compound tablets were offered at less than a rupee per 1,000; if such tablets contained even half a grain of quinine the sale would be conducted at a loss. A philanthropic society which dispenses charity so carelessly that it makes no attempt to enquire into the credentials of the recipients would not exist for long and we may assume that this was not a circular from a philanthropic society, but from a bogus drug-concern whose interest in the 'helpless victims of malaria' amounts to an attempt to persuade union boards to purchase at an 'attractive' price entirely useless drugs, which not only leave the malarial parasite untouched, but discourage the patients from obtaining genuine quinine from other sources, and in a large number of instances thereby actually cause their deaths. The issuers of such circulars are as surely murderers as if they had stuck a knife into the backs of their 'indigent and helpless victims'.

At a later meeting of the All-Bengal Compounders' Association an account of which appeared in the *Statesman* of 28th March, this subject of the adulteration of drugs was fully discussed; at this meeting a new association, named the Bengal Pharmaceutical Association, was formed whose object is 'to establish the pharmaceutical profession on a scientific and ethical basis and to protect the public from the grave dangers to which it is constantly exposed, due to the scandalous way in which the drug trade is carried on in the country'. This statement shows that the new association is alive to the necessity of improving the status of pharmacists and at the same time the quality of drugs. It has begun its life under the chairmanship of Lieutenant-Colonel Chopra, who will be assisted by a strong committee, and, although at present it bears the provincial prefix 'Bengal', we hope soon to see this give place to one of 'All-India', for it is only by embracing the country as a whole that any real progress can be hoped for. Needless

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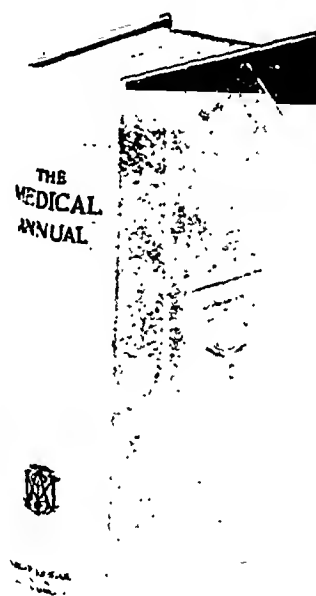
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the faeces completely. A glass rod or a small stiff piece of stick may be used for stirring the mixture: if a glass rod is used, it should of course be thoroughly washed before use on a second stool; and if a stick is employed, it is best discarded after being used once.

When the emulsion is satisfactorily made, more salt solution is slowly added, the stirring being continued meanwhile, until the tin is nearly full. At this stage it is an advantage to remove any large flakes of vegetable matter that may have floated to the surface; this can be done without fear of removing any eggs, because they take longer to come to the surface of the fluid. The final filling of the tin is best done with a pipette with a rubber teat, adding salt solution drop by drop until a very slight convex meniscus is formed, and it is easier to judge the correct degree of filling if one stoops so that the eye is nearly on a level with the top of the tin. One of the microscope slides is now carefully laid on the top of the tin so that it occupies a central position, and if the height of the meniscus has been properly judged the surface of the fluid will be in contact with the slide, with the exception of only a small air bubble, and none of the fluid will have run down the outside of the tin. The only way to find out the correct size that the meniscus should be is by personal practice. It is a good thing to place a sheet of glass on the laboratory bench on which to stand the tins, because it provides a good level surface and also is easily cleaned if any fluid happens to run over from them.

The preparations should now be left standing for not less than twenty minutes and not more than half an hour. The reasons for thus limiting the time are that the eggs come to the surface fairly slowly; so, if the slide is removed too soon, it will not have on it the maximum number of eggs it is possible to obtain; and, if the slide is left too long, the salt solution exercises osmotic pressure on the eggs so that the contents become isotonic with the solution and they tend to fall away from the slide.

When the proper time has elapsed the slide is lifted from the tin, turned over and placed under the microscope. It should be lifted steadily and fairly rapidly and at the same time kept horizontal; this is best done by using the thumbs and forefingers of both hands on the corners of the slide. The slide is now quickly turned over without any jerking, so that none of the fluid runs off. It is easier to do this if the slide is turned towards one, that is, if the edge of the slide furthest from the body is turned downwards. A little practice will probably be necessary to find the correct speed at which to turn the slide so that it is not done so slowly as to allow the fluid time to run off, nor so rapidly as to jerk it off into the air.

The slide is now placed under the microscope and examined with a two-thirds objective

and any eyepiece from numbers two to four of any ordinary make of microscope. A cover glass is not needed and the upper surface of the fluid should be focused because the eggs will be floating on it. A mechanical stage on the microscope is an advantage, but not a necessity, and it is not necessary to examine the film of fluid to its extreme edges because as it is convex the eggs tend to float upwards towards the centre of the film.

If this method is properly carried out, it is of such accuracy that if hookworm eggs are not demonstrated after the examination of a patient's stool on two different days, it may be safely concluded that hookworms are not present in sufficient numbers to produce symptoms of disease.

If several stools are to be examined on any given day, it is well to prepare them all first, provided this does not take more than half an hour. They can then be examined one after the other under the microscope and no time is lost in waiting for the first one that was mixed to be ready.

As the microscope slide will be used over and over again, care must be taken that they are properly cleaned, because if they are allowed to become the least bit greasy this will seriously interfere with the results.

Although this method was primarily devised for the rapid detection of hookworm eggs and is still mainly used for this purpose, it demonstrates very nearly all the other helminth eggs found in stools in India, so, for all practical purposes, it may be taken that it reveals the presence of any intestinal helminths found in this country.

Part II

A.—Eggs that are demonstrated by the salt flotation technique described in part I

Hookworm eggs.—Although the eggs of *Ancylostoma duodenale* and *Necator americanus* are stated in textbooks to be of different sizes, those of *A. duodenale* being relatively short and broad compared to those of *N. americanus*, this difference only emerges after large numbers of eggs from both species have been measured and the means of the lengths and breadths are taken, but so many eggs in the two series fall in the intermediate group that measurement of one or two eggs is quite useless as a means of determining the species of the parent worm. A more important reason against wasting time in trying to determine the species of worm in this way is that both worms are got rid of by the same form of treatment and both cause the same symptoms of disease, though there is some evidence that *A. duodenale* is more severe in its effects than *N. americanus* per individual worm. The sizes given in all the textbooks I have consulted for the eggs of these two species are all different, so this indicates that there is considerable variation in the size of the eggs. A convenient

guide in round numbers is to consider the eggs of both these species to be between 0.06–0.07 mm. in length by 0.035–0.04 mm. in breadth, though eggs as much as five microns above or below these dimensions may be found occasionally. *A. braziliense*, the hookworm of the cat, which is common in both dogs and cats in India, may occasionally be found in human beings also, and the eggs of this species are always smaller than those of the other two, being about 0.05 mm. by 0.03 mm.

Hookworm eggs, of whatever species, are symmetrical oval bodies with parallel sides and rounded ends. Under the low power they are seen to have a thin shell with a single contour, and they are practically filled by a segmented morula. It is often stated that the morula is in the four-celled stage of division when the eggs are passed, and this seems to be so generally known that inexperienced workers think that, if they see an egg with more than four cells in it, it must belong to *Strongyloides stercoralis*, but as far as my experience goes with this worm it is practically always the larvæ and only very rarely the eggs that are found in the stools. In a hot climate development of hookworm eggs is fairly rapid so that in a few hours a many-celled morula may be present. From a series of observations I have made in Calcutta I have come to the conclusion that four-celled morulae are rare in hookworm eggs even in fresh stools. On one occasion I found larvæ present within five hours of the stool being passed; this is of course exceptional, but it is quoted to illustrate the speed with which development may take place. It may be taken as a safe rule that if eggs of the correct shape and size are found in a stool they are hookworm eggs, no matter what the stage of development of the contained morula.

Eggs of Ascaris lumbricoides.—*Ascaris* eggs are oval with a thick shell, they are usually surrounded by a thick albuminous coat with a knobby surface something like a mulberry, and stained brown from the faeces. These eggs always contain a single-celled morula and as it takes about ten days for a larva to develop within them they present no difference at the end of a few hours. These eggs measure 0.07–0.05 mm. by 0.05–0.04 mm. In addition to eggs of this type unfertilized eggs, which have quite a different appearance, are often found in stools, but as they are not brought up in salt solution they will be dealt with at the end of the paper along with the other eggs that fail to float by this method.

Eggs of Trichuris trichiura.—These eggs are often described as barrel-shaped, but the ends are very small in proportion to the maximum diameter of the egg. The shell is thick, smooth and is stained dark brown, and there is an opening at each end which is closed by a thick plug-like operculum which is not stained. The development of these eggs is even slower than those of *ascaris* so in fresh stools the contents

are always in the form of a single-celled morula. They measure 0.055–0.050 mm. in length and 0.025–0.020 mm. in diameter.

Eggs of Trichostrongylus.—This infection is fairly common in certain tea districts, particularly in the Bengal Dooars. The eggs are of the same type and general appearance as those of hookworms but they are distinctly larger, the ends are more pointed, and the cell morula occupies only the middle of the egg and does not extend so near to the ends as in hookworm eggs. *Trichostrongylus* eggs of the species found in human beings in India are about 0.095–0.075 mm. in length and 0.045–0.035 mm. in breadth. These eggs are never numerous in the stools and are therefore only rarely seen. The worms themselves are unaffected by treatment, but this is not of great importance as they are never numerous and never appear to give rise to symptoms. But it is important to be able to differentiate these eggs from hookworm eggs, because the writer has had a man with this infection sent to him as an incurable hookworm infection who had undergone five treatments with carbon tetrachloride and was still passing eggs, which were *trichostrongylus* eggs.

Eggs of Enterobius vermicularis.—This worm is more popularly known as *Oxyuris*. These eggs are easily recognized as they are asymmetrical with one side somewhat flattened, and they always contain an embryo in the 'tadpole' stage of development. The shell is colourless. They measure 0.06–0.05 mm. in length, and 0.03–0.02 mm. in breadth.

Eggs of Heterodera radiclecola.—Some years ago an American worker, not skilled in helminthology, reported the eggs of a supposed new human parasite in the stools of army recruits in America, and he called this *Oxyuris incognita* on account of the fancied resemblance of these eggs to those of *oxyuris*. This was followed by the discovery of similar eggs in human stools in various parts of the world including India. Later, a second American found that these eggs were really from a free-living nematode which lived on vegetable matter, and so were accidentally swallowed and appeared in the stools. It is thus clear that they are not true parasites of human beings and are consequently of no real importance. At the same time it is important to know these eggs and to know that their presence requires no treatment. The eggs are large, being about 0.1 mm. in length and 0.045 mm. in breadth, and they are usually slightly flattened or concave on one side. Another characteristic appearance is the presence of large oily-looking refractile droplets at one or both ends of the cell morula. Sometimes these eggs are found containing embryos.

Eggs of Strongyloides stercoralis.—The eggs of this worm are rarely found in stools, as they only appear in cases of acute diarrhoea when the stools are examined immediately. In any case,

keeping the stool for an hour or two will ensure the development and hatching of larvæ, a process which is always much slower in hookworm eggs in stools. The newly-hatched larvæ can be distinguished from hookworm larvæ, but this requires considerable experience in examination of worms, and also much more time than a busy practitioner is likely to have at his disposal. As a practical guide it may be taken that if larvæ are found in a stool on the same day on which it is passed they are strongyloides and not hookworm larvæ.

Eggs of Hymenolepis nana.—It is important to be able to recognize the eggs of this small tapeworm, because it is fairly common in India and it sometimes gives rise to gastro-intestinal symptoms; also the worm itself, on account of its small size, is not seen by the patient like the larger tapeworms are, so its presence may be unsuspected until the eggs are found. It is treated in the same way as *Tænia saginata*, but on account of its power of completing its life cycle in the intestine it is much more difficult to eradicate and so treatment often has to be repeated several times. The eggs are usually brownish in colour and spherical, or sub-spherical, measuring 0.045–0.030 mm. in diameter. The contained oncosphere is much smaller being 0.019–0.016 mm. in diameter, and is surrounded by two membranes separated by an apparently semi-fluid substance. The outer of the envelopes has two nipple-like processes, one situated at each end of the egg, and from these five or six long filaments arise; they are easily seen in freshly-passed eggs. The embryo has three pairs of lancet-shaped hooks, such as are found in all tapeworm eggs.

Eggs of Hymenolepis diminuta.—This worm is a normal and common parasite of the rat, but it is occasionally found in human beings. Although considerably larger than *H. nana* the segments of this worm are rarely seen in the stools on casual inspection, so it is of importance to recognize the eggs. The eggs are oval and 0.085–0.060 mm. in maximum diameter; the outer shell is usually brownish and is somewhat denser than that of *H. nana* eggs. The oncosphere measures about 0.036 mm. in length by 0.018 mm. in breadth, and it is surrounded by two membranes with polar thickenings like those of *H. nana* but without any filaments. The embryo contains the usual three pairs of hooklets.

B.—Eggs that are not floated by saturated salt solution

Fortunately the eggs that this technique fails to deliver by flotation are not of great importance in India, so that few intestinal helminths will be missed if this method alone is used in diagnosis, but it is proposed to give a short description of all the other eggs that have been recorded in patients in India.

Unfertilized eggs of Ascaris lumbricoides.—These are fairly common and may be found

in stools along with fertilized eggs. They are very different in appearance from normal eggs; this can be best appreciated by reference to plate VI, figs. 1 to 7, which shows the commoner shapes that this type of egg may adopt, though much the most usual type is the elongated variety. The contents of unfertilized eggs instead of consisting of a single cell are composed of an indefinite mass throughout which are scattered numerous highly refractile granules. Apart from the recognition of what these unusual eggs are, they are of slight importance because if only unfertilized eggs are present in a stool it means that only female worms are present in the patient, and as the two sexes are fairly evenly distributed it is rare to find more than one or at most two female worms alone, therefore only unfertilized ascaris eggs indicate a light infection.

Eggs of Tænia saginata.—These eggs are slightly oval and they are generally found in the stool without the thick outer envelope, which carries two long filaments. The egg without its outer shell measures 0.04–0.03 mm. in length by 0.03–0.02 mm. in breadth, including the thick brownish shell which has fine radial striations. The embryo within this shell contains three pairs of hooks.

Eggs of Tænia solium.—These eggs are about the same size as those of *T. saginata*, but they are spherical, and this is their only real distinguishing character.

Recognition of the eggs of both these species is of little importance, however, because persons with either of these worm infections practically always come with the complaint that they are passing chains of segments at frequent intervals and these are easily identified.

Tænia saginata is only acquired by eating insufficiently cooked beef, so its incidence in India is confined to those who eat oxen; whereas *T. solium* infection is confined to pork, so this worm is even rarer in India than is *T. saginata*, because the number of people who eat Indian pigs is even less than that of persons who eat beef. A simple method of diagnosis, by the examination of a gravid segment taken from the stools and washed, is to place such a segment between two slides and to apply strong pressure so that it is flattened and thinned sufficiently to become partly transparent. The lateral uterine branches may then be counted with a hand-lens or under the lowest power of the microscope. In *T. solium* the maximum number of uterine branches on one side is twelve, whereas in *T. saginata* there are always more than twenty and frequently over thirty branches on each side.

Bertiella studeri is a tapeworm that has been found in monkeys in several parts of the world, and it has been recorded nine times in human beings. Two of these nine records have been from Eastern Bengal, the last one being made by the writer about three years ago. It is not known how this infection is acquired, but it is

certainly not from eating meat, and it is much more probably picked up from some accidentally swallowed insect which acts as intermediate host.

Eggs.—The eggs of this tapeworm are easily distinguished from those of the *tænia* and *hymenolepis* species that have been described above, for they have a peculiar pair of horns on the outer side of the inner shell which are known as the 'pyriform apparatus', a characteristic of the eggs of all the members of the family *Anoplocephalidae*, to which this worm belongs.

If gravid segments of this worm are found in the faeces, they are easily distinguished from those of the *tænia* because they are always much broader than long, whereas gravid segments of *tænia* are longer than broad.

No trematode eggs float in saturated salt solution, so the only way of finding them is in a faecal smear. Trematode infections in human beings are rare in India, but those that do occur are found mostly in Bengal and Assam, and in all of them there is a close association with the same infections in pigs.

Fasciolopsis buski.—This infection has occasionally been found in Eastern Bengal, though it is much more often found on the eastern side of the Siamese peninsula. Occasionally this worm gives rise to severe intestinal symptoms such as pain, diarrhoea and passage of blood, and in heavy infections ascites and generalized oedema are seen. Death has been known to occur as a direct result of infection by this worm. It is accordingly worth while being acquainted with the eggs of this trematode because such knowledge may be of use in diagnosing an occasional case with otherwise unexplained abdominal symptoms. This is especially important, because correct diagnosis will lead to rapid and certain cure as the worms are almost always totally evacuated after a single dose of carbon tetrachloride or tetrachlorethylene.

F. buski is really a parasite of pigs and only occasionally gains access to human beings, so that it is practically always found in persons having close association with these animals. It is also known that the cercaria (infective stage) of this worm encysts on the outer covering of the water chestnut (*Trapa biocornis*), and that it is swallowed when this covering is being removed by the teeth, a common practice among the people.

Eggs.—The eggs of *F. buski* are oval and rounded at both ends with a thin shell and an operculum at one end. They are usually brownish in colour. They measure 0.14–0.13 mm. in length and 0.085–0.08 mm. in breadth; they are thus practically the same in size and appearance as the eggs of *Fasciola hepatica*, but as far as is known this worm has not been found in human beings in India.

Gastrodiscoides hominis.—This fluke was first described from material obtained from a human

being in Assam, but like *F. buski* it has since then been recognized as a much commoner parasite of the pig than of man. This worm lives in the caecum and colon, and it may possibly give rise to diarrhoea and pain, although the writer has never seen a case of this infection. It is probable that carbon tetrachloride would effect a cure. The life history is not known.

Eggs.—The eggs are oval and have an operculum at one end. They may be distinguished from those of *F. buski* as they are slightly longer and narrower, being 0.15 mm. in length and 0.07–0.06 mm. in breadth.

Paryphostomum sufaratyfex.—Since its discovery this worm has been placed in several different genera but under whatever generic name it may be encountered in the literature, it may be recognized by its uncommon specific title *sufaratyfex*.

This worm was first described from some badly preserved specimens obtained from a girl in Assam and like both the above flukes it is now known to be a true parasite of the pig. This is the only record of its occurrence in a human being and it is possible that it will not live in the human intestine and is only accidentally swallowed as an adult. The writer expresses this view because on one occasion a girl was admitted to the Carmichael Hospital for Tropical Diseases with kala-azar, but without intestinal symptoms, and eggs which were referred to this species were found in her stools the day after admission. Although the stools were all carefully saved thereafter for over a week no eggs were again found, nor were the parasites passed in recognizable form, so it is thought they must have been digested.

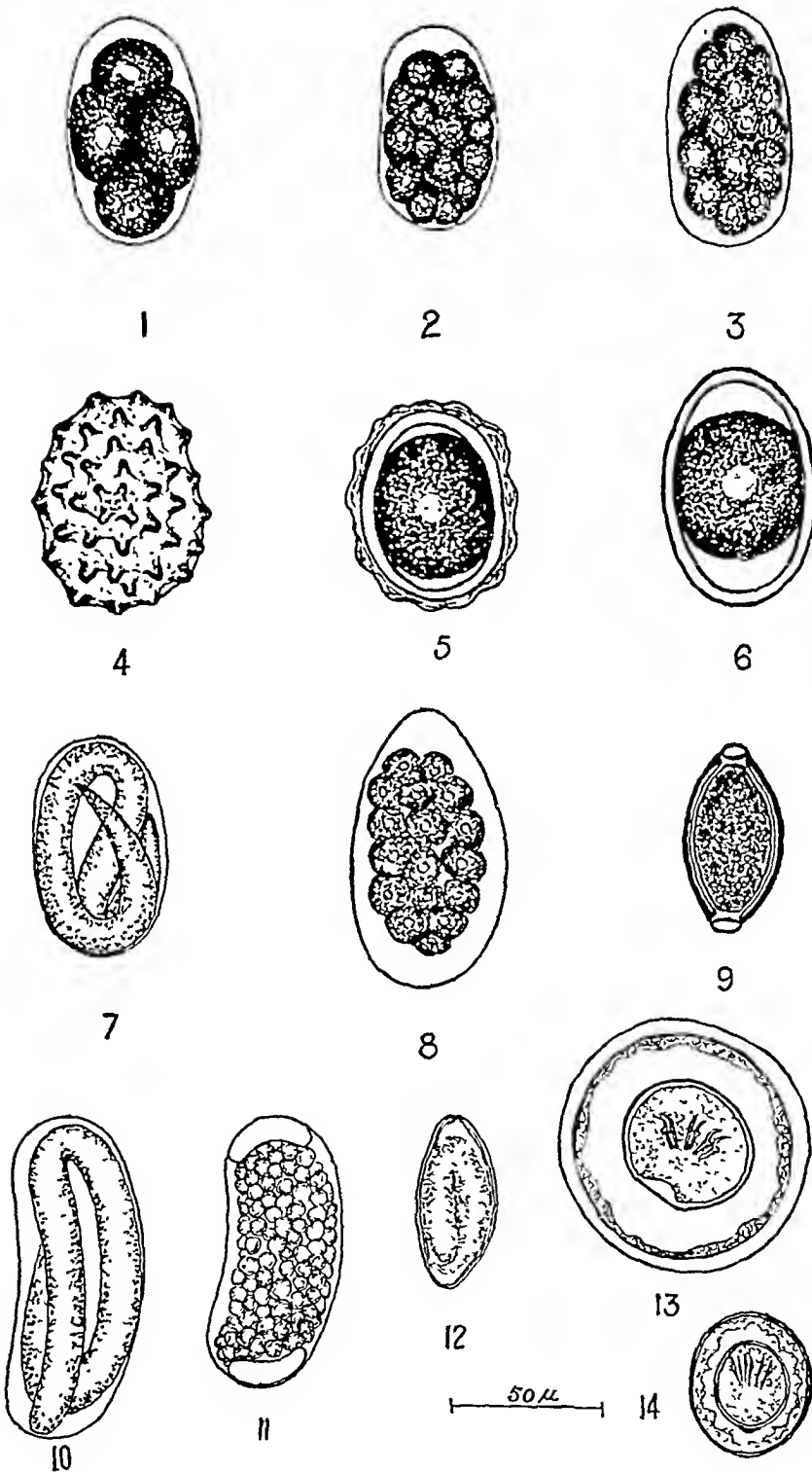
Eggs.—The eggs are oval and have an operculum at one end; they are 0.12–0.09 mm. in length by 0.07–0.06 mm. in breadth.

Heterophyes heterophyes.—This fluke is common in Egypt and, as far as the writer is aware, the only instances of its occurrence in India are the one or two unreported cases in which the eggs have been found in the Calcutta School of Tropical Medicine during the course of routine stool examinations.

Eggs.—The eggs have a thick shell with a slight suggestion of a flask-shaped neck at the opercular end, such as is clearly seen in *Clonorchis sinensis* eggs. They are much smaller than any of the above described eggs being 0.3 mm. in length by 0.017 mm. in breadth.

From the above remarks it will be clear that trematode infections play a small part in Indian parasitology as far as human beings are concerned. Of course it is possible that such infections as *Clonorchis sinensis*, or one or other of the Schistosomes, may be encountered in persons who have come to India from endemic foci of these various infections, but they do not occur naturally in this country so, as it has been decided to adhere strictly to the

PLATE V



Eggs that float in saturated salt solution.

Figs. 1 to 3—Hookworm eggs in different stages of development

Figs. 4 to 6—*Ascaris* eggs Fig 4. Surface view. Figs 5 and 6 Optical section.
Fig 5. With albuminous envelope. Fig 6. Without albuminous envelope

Fig 7—*Strongyloides* egg.

Fig 8—*Trichostrongylus* egg.

Fig. 9—*Trichuris* egg.

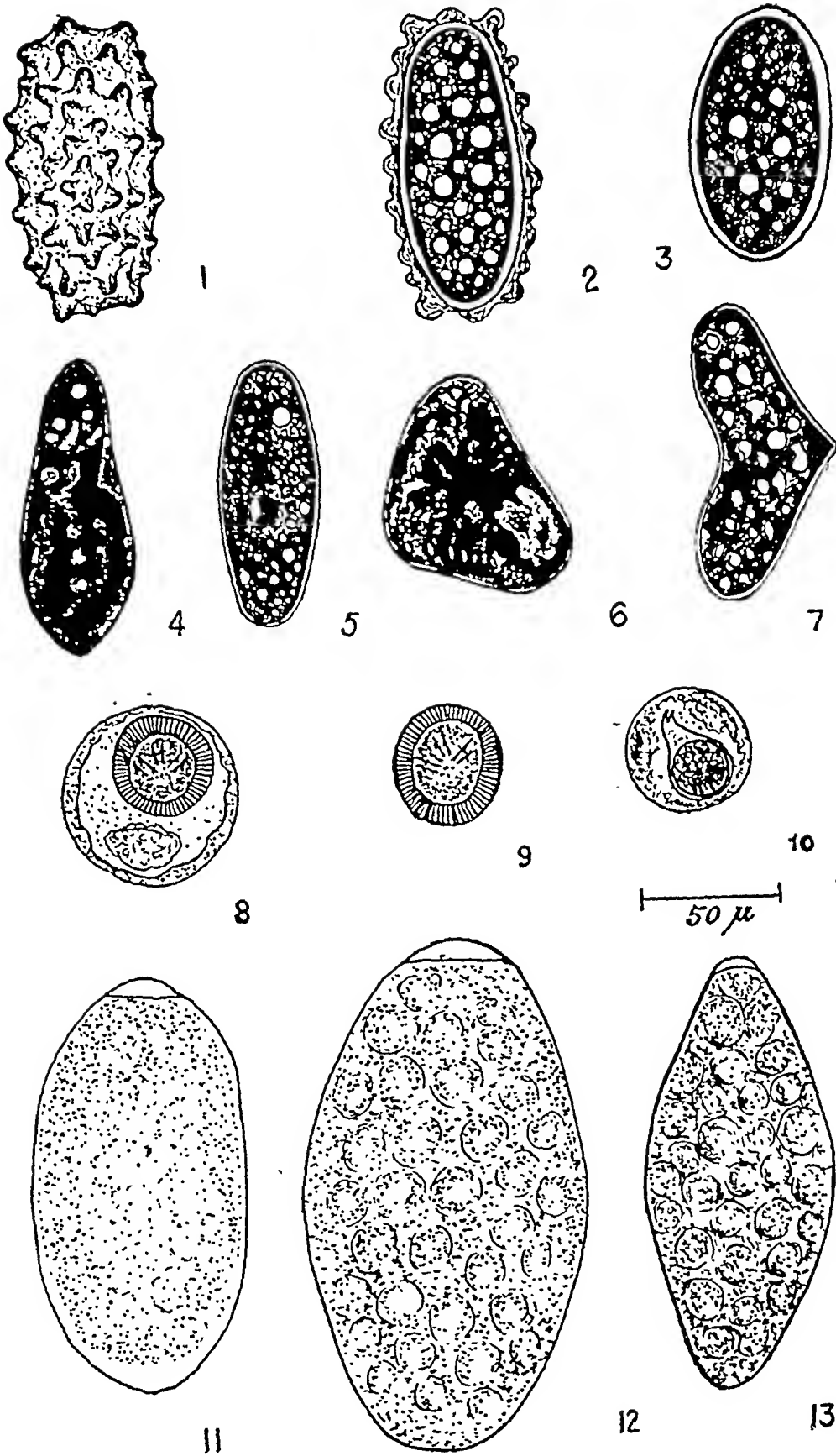
Figs. 10 and 11—*Heterodera* egg Fig 10 Embryonated. Fig. 11. Partially developed.

Fig 12—*Enterobius* egg

Fig. 13.—*Hymenolepis diminuta* egg.

Fig. 14—*Hymenolepis nana* egg

PLATE VI



Eggs that do not float in saturated salt solution.

- Figs. 1 to 7.—Unfertilized ascaris eggs. Figs. 1 to 3. Shape most commonly seen. Fig. 1. Surface view. Figs. 2 and 3. Optical section. Fig. 2. With albuminous envelope. Fig. 3. Without albuminous envelope. Figs. 4 to 7. Shapes occasionally seen.
- Figs. 8 and 9.—*Taenia saginata* egg. Fig. 8. With external envelope. Fig. 9. Without external envelope.
- Fig. 10.—*Bertiella studeri* egg.
- Fig. 11.—*Paryphostomum sufraginex* egg.
- Fig. 12.—*Fasciolopsis buski* egg.
- Fig. 13.—*Gastrodiscoides hominis* egg.

descriptions of eggs which are actually found in India, no description of them is given.

Part III

The number of drugs recommended for the treatment of all forms of worm infections is enormous, and this in itself is an admission that most of them must be quite ineffective; we have accordingly decided to limit our remarks to those few remedies that we ourselves have found the most effective.

Carbon tetrachloride.—We used this drug for many years, either alone or combined with oil of chenopodium for the treatment of hookworm infection. Although we have seen no fatalities, nor even alarming symptoms from its use, a considerable number of deaths have occurred in labour forces in India, especially in the tea districts. Close inquiry into as many of these cases as we have been able to make has revealed that, although many of them can be attributed to the poisonous effect of carbon tetrachloride when taken either shortly before or after moderate amounts of alcohol, there are still a few remaining deaths that can only be explained on the theory that certain persons possess an idiosyncrasy for this drug, which previous examination will not reveal. These are great objections to any drug, for use on a large scale, especially among coolies who are accustomed to use alcohol in considerable amounts, and our advocacy of carbon tetrachloride has always been qualified by warnings as to the need of care in its use, but we have consistently recommended it because it has appeared to us the best drug available for the removal of hookworms, and we have only recently abandoned it in favour of another chloroform derivative.

Carbon tetrachlorethylene.—We have recently completed a long trial of this drug as a cure for hookworm infection and we have also carefully tested its toxicity on cats, animals which show a marked susceptibility to carbon tetrachloride. Our conclusions are that this drug is possibly a little more effective than carbon tetrachloride in removing hookworms and that it is less toxic; a further great advantage of tetrachlorethylene is that alcohol does not appear to increase its toxicity. It is true that patients exhibit similar symptoms to those noticed immediately after tetrachloride, but the signs are only those seen after any diffusible stimulant and they rapidly pass off leaving no permanent damage.

Oil of chenopodium.—If the dosage is carefully regulated and the persons treated are not unduly debilitated this drug is perfectly safe. It is useful in treating hookworm infection and is also one of the most effective drugs in removing ascaris. Most of our patients have both hookworm and ascaris infections, therefore nearly all our treatments consist of a combination of tetrachlorethylene and oil of chenopodium, the detail of which is given below. In

uncomplicated ascaris infection chenopodium may be given alone or combined with santonin. If given alone this drug is more efficient in divided doses, the total amount administered being more than when a single dose is given.

Santonin.—This drug is approximately as efficient as oil of chenopodium against ascaris, but we find that if the two are combined a slightly higher cure rate is obtained.

Hexylresorcinol.—This drug has been introduced recently for the removal of both hookworm and ascaris, and after testing it in Calcutta we have come to the conclusion that it is not very effective against hookworm, but is fairly good in removing ascaris. It is very expensive and on this account is not suitable for use on a large scale. We have found that it will remove about fifty per cent of tapeworms with one treatment, and as it is relatively harmless to human beings it has a certain value for treating tapeworm infections in persons accustomed to take alcohol regularly, as it is in such people that the use of carbon tetrachloride is always attended by a certain element of danger. As it is not at all unpleasant to take, the fact that the dose may have to be repeated to effect a cure is not of great importance. The efficacy of this drug is greatly impaired by the presence of food in the intestine, so rigid precautions have to be taken if success is to be anticipated. The patient should receive a brisk saline purge the day before treatment and only a very light meal, such as bread and butter and a little milk that evening. One gramme (15 grains) of the drug freshly placed in hard gelatin capsules (four ten-minim capsules are required to contain the dose) are given on an empty stomach the next morning, and no food at all is allowed for at least four hours afterwards. The drug is not absorbed in any quantity so a purgative to clear it out is not essential. Indeed in many cases hexylresorcinol appears to have a distinct but in no way unpleasant purgative action itself, two or three copious watery stools being passed during the five or six hours after its ingestion, but there is no colic or tenesmus attending this action.

Gentian violet.—Ordinary gentian violet for staining or pure crystal violet is used. This is claimed by some workers to be a certain cure for strongyloides infection. We have tried it on a good many patients but have not had many successes, but it may be tried in cases of this infection with gastro-intestinal symptoms apparently referable to the presence of these worms. The way to give the drug is to prepare nine hard gelatin capsules each containing one grain of powdered gentian violet, and to give one capsule three times a day for three consecutive days, and to examine the stools a week later for the presence of worms. No dietetic or purgative precautions are necessary during the course of treatment.

Ancylostoma duodenale and *Necator americanus*.—Take two ounces of a saturated solution of magnesium sulphate and place it in a bottle or flask of three or four ounces capacity; add to this 3 or 4 c.cm. (1 drachm) of tetrachlorethylene and 1 c.cm. (15 minims) of oil of chenopodium; close with a cork and shake violently so as to distribute the drugs in fine droplets evenly throughout the purgative; at once pour the mixture into a glass and give to the patient. This treatment is best given in the morning before breakfast, and no food is allowed until the bowels have acted well; after this has occurred, food may be taken without any restriction. Even if these drugs do not remove all the worms present they stop the female worms laying eggs for about a week or ten days, therefore if the results of treatment are to be estimated by the use of the microscope, the stools should not be examined until about a fortnight later when the treatment can, if necessary, be safely repeated.

Ascaris lumbricoides.—In the treatment of uncomplicated ascaris infection with oil of chenopodium alone it is best to give three doses each of ten minims in gelatin capsules at intervals of one hour and to follow the last dose with a brisk saline purgative after an interval of half an hour. The treatment should be given before breakfast in the morning and no food allowed until the bowels have acted. If santonin is used three grains are given in powder together with 1 c.cm. of oil of chenopodium early in the morning, a saline purgative is given three or four hours afterwards, and food is allowed as soon as the bowels have acted. We have found that santonin given in this way is just as effective as when given at night with a purgative the following morning.

Trichuris trichiura.—This worm lives in the cæcum and it is very difficult to eradicate, but although we do not often completely cure an infection we often note that a large number of these worms are evacuated after an ordinary combined hookworm treatment. Since we have begun the use of tetrachlorethylene we notice more trichuris are being passed than they were with carbon tetrachloride, so it is possible that it is more effective against this species.

Enterobius vermicularis (*Oxyuris*).—The number of drugs recommended for treatment of this infection is an indication that no true cure exists. The main location of these worms is the cæcum so it is not of much use to employ rectal injections such as are often recommended, because all they will do is to remove the worms that have wandered down to the descending colon and sigmoid; all that can be hoped for by this means is temporary relief. It is probable that oxyuris infections frequently die out naturally so if re-infection by the fingers is prevented a case will often clear up. The female worms wander out of the anus at night and deposit their eggs on the skin near by; this

causes intense itching and the desire to scratch. In this way eggs are picked up under the finger nails and conveyed to the mouth, and to prevent this the region of the anus should be smeared with dilute ammoniated mercury ointment every night before going to bed. This serves the double purpose of killing the worms and their eggs and also of allaying the itching to some extent. Children are most easily prevented from scratching the anal region by applying a light splint to each elbow. The drugs used for hookworm treatment often cause large numbers of oxyuris to pass so this may be employed because if such treatment does not cure a case it will at least greatly lessen the number of worms and so hasten the eventual natural cure. Free purgation alone also causes the evacuation of large numbers of oxyuris occasionally, so it is useful to take a brisk saline purge from time to time.

Trichostrongylus species.—This worm has up to now resisted all forms of treatment, but as the infection is not common and is never heavy enough to give rise to symptoms it is not of great importance. Since we have begun the use of tetrachlorethylene we have had one or two patients who harboured this infection along with hookworm, and the trichostrongylus eggs have disappeared at the same time as the hookworms. We have not had enough experience yet to express a definite opinion on this point, but it is possible that this drug is a cure for the condition.

Tænia saginata and *Tænia solium*.—The best drug for removing these worms is carbon tetrachloride; we have found tetrachlorethylene to be quite ineffective for this purpose. No special preparation of the patient is necessary and the only dietary precaution needed is to see that patients have no alcohol for two or three days before treatment. A light meal is given the night before treatment and in the morning 3 c.cm. (45 mins.) of carbon tetrachloride are shaken up in two ounces of a saturated solution of magnesium sulphate. No food is allowed until the bowels have acted, and alcohol is forbidden for two or three days after treatment. We have found this treatment to remove about 80 per cent of tapeworms at the first attempt, but if carbon tetrachloride is contra-indicated the less efficient, but much less toxic, hexylresorcinol may be used. How to use this drug will be found under the description of hexylresorcinol.

Hymenolepis nana.—This worm is removed by the same treatment as will remove the large tæniæ, but it is improbable that a single treatment will suffice to bring about a complete cure. The reason for this is that auto-infection in the gut takes place and the young worms pass through their larval stages inside the intestinal villi. In this position they are not reached by an anthelmintic and although the adults that are in the intestine are cleared

out by the treatment, the young worms develop and in turn come to reside in the gut and thus continue the infection. It is important completely to cure persons if possible because this habit of auto-infection may eventually lead to a very heavy infection from a single adult worm.

Hymenolepis diminuta.—This worm has a complex life history needing an intermediate host and it cannot multiply in the intestine, therefore it is probable that a single treatment, the same as that given for *tænia* infection, will effect a cure.

Bertiella studeri.—This worm is also easily removed by routine tapeworm treatment.

Fasciolopsis buski.—This fluke is easily removed with carbon tetrachloride and probably also by tetrachlorethylene, but we have had no opportunity of trying the latter drug on an infection with this parasite.

Gastrodiscoides hominis and *Paryphostomum sufrartyfex*.—Both these flukes would almost certainly be got rid of with carbon tetrachloride or tetrachlorethylene, but we have never seen a case of either infection in human beings, on which to try these drugs.

Medical News

ALL-BENGAL COMPOUNDERS ASSOCIATION

THE presidential address of Lieutenant-Colonel R. N. Chopra, C.I.E., I.M.S., at the annual meeting of this association, held at the All-India Institute of Hygiene and Public Health, Calcutta, during January of this year, contained matter of such great importance to the medical profession in this country that we have given a very extensive extract from it below:

Pharmacy in India

As a pharmacologist who has to work with drugs, I am very greatly interested in the profession of pharmacy which you practise. The important part which pharmacists play in relation to drugs needs no special emphasis. You, as their representatives in this country, are the custodians of drugs. You prepare and compound drugs and on your efficiency depends the purity and efficacy of the preparations dealt with by you. Your relation to the practice of medicine in everyday life is intimate and you are an integral part of it. The busy physician dealing in diagnosis and treatment of disease has no time at his disposal to dispense his own medicine as he used to do in the old days. Pharmacy has developed enormously along with medicine and the wider scope of the two sciences makes it impossible for the medical practitioner to devote himself systematically to the study of pharmacy. In matters of drugs, their preparation and dispensing, therefore, the physician has to depend entirely on the advice and guidance of the pharmacist. The physician has sometimes to use very potent drugs which require to be handled with most exact and scrupulous care. Skillful dispensing is essential for successful treatment of disease by those practising medicine.

Pharmacy and purity of drugs

Again the question of purity of drugs and the profession of pharmacy are interdependent. In early days pharmacists as a class were practically traders and retail dealers in crude drugs of vegetable and animal origin, and were themselves responsible for their purity and quality. With the development of modern medicine the number of drugs has enormously increased and, by introduction of newer methods of analysis and assay, the realm of pharmacy has considerably widened. The modern pharmacist has to have an intimate knowledge of the chemical and physical properties of drugs and also the necessary knowledge and skill to deal with them. It follows, therefore, that the efficiency of persons, engaged in the exercise of the profession of pharmacy, bears an important relationship to the purity and conformity to proper standards of drugs and chemicals manufactured, imported into and sold in the country. I was, therefore, very glad, when

in 1930 I was appointed chairman of the Drugs Enquiry Committee, to enquire into the extent to which drugs and chemicals of impure quality or defective strength are imported, manufactured and sold in the country, that one of the terms of reference of this committee was 'to enquire into the necessity of legislation to restrict the profession of pharmacy to duly qualified persons and to make recommendations'. It is a matter of common knowledge that drugs in the Indian market are not above reproach and that many of them are of impure quality and defective strength. That in regard to adulteration, deterioration or tampering with the quality or strength of drugs very little distinction could be made between imported and locally-manufactured preparations. Being conscious of the close relationship between the two and knowing the state of the profession of pharmacy in India, I fully realized from the beginning that one could not be improved without the other. The supply of pure and up-to-standard drugs is dependent on an efficient profession of pharmacy. An opportunity was thus offered to me to suggest improvements with regard to this important and yet very neglected profession without which the medical profession cannot efficiently carry on its duties.

Present position of the profession of pharmacy in India

Here I would like to make a brief reference to the present position of the profession of pharmacy in India. It is painful for me to say that there is no organized and self-contained profession of pharmacy in this country in the sense in which it exists in other civilized countries. In this advanced age of systematization and methods in every department of life, this may sound strange, but it is none the less literally true. The profession here is represented by a set of people whose status, functions and duties are ill-defined and improperly understood. They carry on the compounding, dispensing and selling of drugs and chemicals from day to day. They handle drugs and poisons with the utmost ease and freedom and in many cases in ignorance of their properties and potency. They also work as dressers and laboratory assistants in some of the hospitals and dispensaries. Anaesthetists and operation assistants are sometimes drawn from their ranks.

The evidence produced before the Drugs Enquiry Committee regarding the character and quality of work turned out by the profession as a whole in this country was far from being complimentary. All sorts of charges of ignorance, carelessness, and lack of responsibility were profusely levelled against it. The weight of evidence was decidedly against the competency of the profession as practised at present, and the public and medical men all over India expressed dissatisfaction with its work. The reason of this is not far to seek

when it is remembered how intimately connected the profession is with the health and well-being of the people at large. Pharmacutists in western countries are conversant with the science of pharmacy and are even able to carry on the duties of manufacturing and analysing drugs. There is no pretence at the cultivation of the science of pharmacy in this country. The profession carries on the art of dispensing mechanically and the majority of those practising it have neither the general education nor the special training to befit them for the discharge of their responsible duties. It is no wonder that they are not equal to the work. The surprise is how they carry on as well as they do.

Training in pharmacy

The causes of this state of affairs are, firstly, the qualification and training of the profession who carry on the onerous and arduous duties of handling and compounding medicines. No definite and uniform standards of training and qualification is enjoined in different provinces of India. The whole system is in a state of chaos.

In many cases no preliminary qualification is enforced. In others the standard of basic education required is very low. No regular rules regarding the qualification and training of compounders are laid down in many provinces. The training given in most places is of a very elementary nature and unsatisfactory. If one considers the condition of the profession as a whole in this country, one is not surprised at the dissatisfaction held by the public and medical men all over India in respect to it. With the exception of Bengal and Madras, where there are recognized courses, in almost every other province no proper course of instruction is laid down. The standard of education is low and not much can be expected by way of professional training. The state of affairs in this country is widely different from that in other civilized countries, where pharmacists are required to have a thorough knowledge of the science of pharmacy and the manufacture of drugs.

The second reason for this state of affairs is that the legislature in this country has not passed any act dealing with pharmacy. The Indian Poisons Act, and the Indian Opium and the Dangerous Drugs Acts only control the manufacture, sale, possession and import of certain drugs, but have no relation to pharmacy generally. They do not ensure that persons selling or keeping open shops for retailing, dispensing or compounding of poisons and narcotics should possess a competent knowledge of their business.

In a few provinces all chemists' shops are obliged to employ qualified compounders for compounding, dispensing and selling drugs, under the provisions of the Municipal Acts. Rules have been framed by some local governments for the systematic training of the compounders in the medical schools or colleges, or hospitals, as the case may be. In most of the provinces, however, there are no regulations whatever. For the convenience of the government and local hospitals a very poor class of compounders is trained; in others no training worth the name is given. In some cases the licenses issued use the words 'chemist' and 'compounders', but no statutory enactment controls their qualifications. The licenses are granted without regard to the necessity for the employment of a person qualified to handle and sell these drugs. Practically all over the country the dearth of legislation to control the practice of this profession is forcibly brought home.

In those provinces where Municipal Acts are in existence, provisions requiring the registration of shops for the sale of drugs and prohibiting the practice of the profession by unqualified persons are included. There are such acts in Bengal, Bihar and Orissa and Assam. Under the enactment here shops, or places for retail sale of drugs recognized by the British Pharmacopœia, which are not articles of domestic consumption, have to be registered and a license obtained. Only certified

persons under the rules made for that purpose can compound, mix, prepare, dispense or sell drugs in any such shop or place. In actual practice, however, the machinery to see that the provisions of these acts are enforced is very inadequate, and the actual state of affairs is not much better than in provinces where there is no enactment.

Pharmacy a neglected profession

It is quite evident that the advantages accruing from the promotion of pharmaceutical education have not been sufficiently appreciated in India. I have pointed out that the basic education is, in many cases, disproportionately low. With the exception of a few provinces the actual course of training is also generally inadequate. It is grossly insufficient to equip candidates for the proper discharge of the responsibilities which fall on them. The superior career of pharmacists is practically unknown. The profession does not attract pupils of good status and education. The remuneration which they receive bears no proportion to the responsible character of their duties. The result is that the profession commands little or no prestige. If the present needs of the country are to be adequately met, a correct conception of the true character of the profession and of its nature, dignity and functions has to be brought home to the people in general. Public opinion must be so educated as to accord to the profession its proper place in the departments of human activities. It must be made impossible for persons without adequate training and qualification to dabble with the profession. A system of training and education suited to the peculiar conditions of the country should be carefully devised so as to lift the profession out of its present unsatisfactory condition.

The necessity for this overhaul of the profession is accentuated by a consideration of the state of the profession in other parts of the world. Pharmacy has attained a very high standard of development in most progressive countries. It is considered there to be an important branch of applied science. Systematic courses of training are imparted in colleges, which are specially designed for the purpose, known as colleges of pharmacy. The subject forms a part of the curriculum of many universities. The standard of education in some important countries of the west is very high. In Great Britain the candidates for the course of pharmacy have to undergo what is practically a two-years approved systematic course of training for the lower qualification and three years for the higher. University degrees are also open to them if they are matriculants. In the United States of America the minimum course is of three years duration. The minimum degree eligible for registration under most state laws is Graduate of Pharmacy. The degree of Pharmaceutical Chemist (Ph.C.) is given for a somewhat more advanced course and the degree of Bachelor of Science in Pharmacy (B.Sc. in Phar.) is conferred upon many students who take a longer and more difficult course. In almost all the countries on the continent of Europe dispensing is reserved exclusively to qualified people and a very high standard of training is maintained.

The remedy

In view of what has been said it will be observed that pharmacy is still in its infancy in India and the profession has not been organized or classed on any definite basis. I have discussed at some length the present state of the profession of pharmacy as it is practised in India and as it is practised in other civilized countries of the world. Although I have perhaps been too out-spoken regarding the present state of affairs, believe me it is far from my thoughts to hurt your feelings. My object is to bring home to you the real state of affairs so that you will realize how your profession, which like medicine is a noble profession, is being practised in this country. Owing to circumstances over which you have no control, it has not only been relegated to the background but has at times

incurred the odium of the public. The remedy of the evils from which you suffer is obvious. You should thoroughly overhaul the profession as it is practised at present and you should reorganize it on a firm and All-India basis. Without going into detail the main points to which attention should be paid are, firstly, that the basic educational qualifications of the entrants to the profession should be raised; secondly, the professional training should be made more practical, thorough, exacting and comprehensive; thirdly, the standards of education should be made uniform all over India; and, lastly, the question of restricting the profession to qualified persons by laying down qualifications, statutory or otherwise, is of very great importance. The exercise of any profession should be subjected to restrictions which make for efficiency and improve the status, dignity and sphere of usefulness. Legislation will have to be enacted, but, if you put your own house in order and improve professional education, it is bound to follow.

I studied the whole question very carefully and in the *Report of the Drugs Enquiry Committee* you will find a scheme for putting the profession of pharmacy in this country on a solid foundation. This scheme was worked out with due regard to the conditions prevalent in India, and, although the scheme may not be perfect and may have shortcomings, it is the best solution of the difficult problem we could find to cure the crying evil, without violent disturbance of the existing state of affairs. I wish to draw the attention of those who are interested in the uplift of the profession to the scheme propounded in this report. Try and improve on it if possible and if you succeed nothing will give me more pleasure. An association such as yours is one which is eminently fitted for such uplift work, and I am glad that you are in earnest about it. Your suggestion for changing the name from Compounders Association to Pharmacists Association is a move in the right direction and will be a step towards raising your status. You may rest assured that, so far as it lies in my power, I will do my best to guide you into the right path towards laying the foundation of the profession of pharmacy in this country.

I would like here to impress on you gentlemen that the changes necessary for the building up of a profession of pharmacy cannot be effected at once. Time, hard work and patience are needed. It is just possible that in the beginning some of you may feel the contemplated changes to be a hardship. The fruit of these changes will, however, gradually come to you. The process of replacement of the old order by the new must necessarily be gradual so as to prevent those practising the profession at present from suffering. If the main outlines of the scheme suggested in the *Report of the Drugs Enquiry Committee* are given effect to, you will see within a decade the beginning of a profession of pharmacy on a par with that in other civilized countries.

THE FACULTY OF TROPICAL MEDICINE AND HYGIENE, BENGAL

At the examination for the diploma of Tropical Medicine (D. T. M. Bengal), held at the Calcutta School of Tropical Medicine in April 1934, the following 32 out of 36 candidates were successful:

Passed

(Arranged in alphabetical order)

- Brajendra Chandra Aich, M.B. (Cal.), private practitioner.
- Hari Pada Banerjee, M.B. (Cal.), D.P.H. (Cal.), private practitioner.
- Jadab Lal Banerjee, M.B. (Cal.), private practitioner.
- Lalit Kumar Banerji, M.B. (Cal.), private practitioner.
- Jnanendra Nath Basu, M.B. (Cal.), worker, health department, Calcutta Corporation.
- Provash Ranjan Bhattacharyya, M.B. (Cal.), D.P.H. (Cal.), private practitioner.

- Rasamay Bhattacharyya, L.M.P. (Assam), assistant medical officer, Bokpara Tea Estate, Upper Assam.
- Sailendra Nath Chattopadhyaya, M.B. (Cal.), D.P.H. (Cal.), private practitioner.
- Subal Chandra Chattopadhyaya, M.B. (Cal.), medical officer, Presidency Jute Mills, Rishra, E. I. Railway.
- Subal Chandra Das, M.B., B.S. (Patna), private practitioner.
- Rameshwar Dayal, M.B. (Cal.), Civil Assistant Surgeon, Government of Bihar and Orissa.
- Lal Rajendranath Shah Deo, M.B., B.S. (Patna), private practitioner.
- Jean Arthur Gemmell, M.B., Ch.B. (Edin.), Women's Mission Hospital, Ajmer Raj.
- Basanta Kumar Ghosh, L.M.F. (Bengal), M.B. (Cal.), private practitioner.
- Nani Lal Ghosh, M.B. (Cal.), private practitioner.
- Rash Gour Ghoshal, M.Sc., M.B. (Cal.), private practitioner.
- Syed Mahmud Hassan, M.B., B.S. (Patna), private practitioner. (Selected for appointment to Bihar and Orissa Provincial Medical Service.)
- Mangesh Narayan Kalbag, M.B., B.S. (Bom.), Captain, A.M.O., medical officer, Co-operative Hospital, Hubli.
- Huai-chieh Kan, M.D., College of Medicine, National Central University, Nanking, China.
- Anil Mukherji, M.B. (Cal.), D.P.H. (Cal.), private practitioner.
- Bodapati Lakshmi Narasimha Rao, L.M.S., assistant pathologist, Osmania Hospital, Hyderabad, Deccan.
- Allen Albert Morris Nolan, I.M.D., Assistant Surgeon, Government of India.
- Norman Charles Parfit, B.M., B.Ch. (Oxford), private practitioner.
- Amrik Singh Pruthi, L.S.M.F. (Punjab), medical officer, Rewat (Rawalpindi).
- Donald Robertson, M.B., Ch.B. (Edin.), medical officer, Mission Hospital, Udaipur.
- Saradindu Kumar Sen, B.Sc., M.B., B.S. (Patna), private practitioner. Awarded the first prize in entomology.
- Tulshi Charan Sett, M.B. (Cal.), private practitioner.
- Surendra Amrit Sharma, M.B. (Cal.), private practitioner.
- Nanda Lal Sinha, M.B. (Cal.), private practitioner.
- Moni Mohan Sircar, M.Sc., M.B., D.P.H. (Cal.), private practitioner.
- Tara Singh, L.S.M.F. (Punjab), L.T.M. (Bengal), private practitioner.
- Yuen-Yo Ying, M.D. (Hunan), L.T.M. (Bengal), Assistant Professor of Medicine, National College of Medicine of Shanghai, China. Awarded the 'Chuni Lal Bose' Gold Medal.

HAILSHAM CHILDREN'S HOME

EUROPEAN exiles in the tropics are sometimes faced with the problem of finding suitable accommodation for their infants or young children.

The 'Children's Home' which has just been opened at Hailsham near Eastbourne by Mr. and Mrs. R. B. Stewart provides an admirable solution.

The 'Home' is situated at an altitude of 500 feet above sea level and faces the south-west. Mrs. Stewart has had several years of experience as a nurse at the famous Great Ormond Street Children's Hospital, and in private work. Among those to whom reference may be made are Miss Tisdale, Matron of the Great Ormond Street Hospital, and Colonel R. M. Green and Major-General Sir John Megaw both retired I.M.S. officers who were well known in India.

The terms are moderate, ranging from two to four guineas weekly according to age and other conditions.

Applications are received by Mr. R. B. Stewart, 'Boynnton', Western Road, Hailsham, Sussex.

Current Topics

The Serum Treatment of Cerebrospinal Fever

By A. FLEMING, F.M.C.S.

and

G. F. PETRIE, M.D.

(Abstracted from *Recent Advances in Vaccine and Serum Therapy*. J. and A. Churchill, London, 1934, p. 130)

DOSAGE AND MODES OF ADMINISTRATION OF THE SERUM

Intrathecal route.—Daily injections of from 30 to 60 c.cm. for adults and from 10 to 20 c.cm. for infants are recommended, and at least four doses in all should be given; the amount of the dose should be less than that of the cerebrospinal fluid which is withdrawn; and the serum should be warmed to body temperature and introduced into the spinal canal by the gravity method at the usual site for lumbar puncture. In order to lessen the risk of a relapse, two or three additional doses of serum should be given after the meningococci have disappeared from the cerebrospinal fluid; and it is advisable to perform several lumbar punctures with the object of promoting drainage of the fluid after the serum treatment has been stopped. According to Neal, the average sporadic case requires 6 to 10 doses of serum; these cases are considered by her to be less severe than those which occur in times of epidemic prevalence. Early administration of the serum is of great importance, since there is abundant evidence that the fatality rate is least among patients whose treatment by serum is begun within the first three days of the illness. Full details of the technique of administration of the serum are given in the memorandum on cerebrospinal fever which has been issued by the Ministry of Health.

Combined intrathecal and intravenous or intramuscular routes.—Herrick maintained that a bacteriæmia is often present and that the meningitis is a secondary complication of the disease; he therefore recommended that the intrathecal injections should be supplemented by large doses of serum given intravenously. The general opinion, however, is not favourable to this practice, except in cases that are predominantly bacteriæmic. Neal is critical of the data on which Herrick based his belief that intravenous treatment improved the clinical results; other workers have seen dangerous reactions follow the method in some patients in spite of negative cutaneous and conjunctival tests for hypersensitiveness and one worker thought that in two patients the intravenous injections predisposed to a fatal issue. Banks has used the method in a small number of cases, and has been favourably impressed by the results; in his experience immediate serum reactions do not occur and even large doses are well tolerated, in this respect contrasting with the reactions that may follow the intravenous injection of diphtheria antitoxin. Nevertheless, the relatively slow course of the disease with the gradual production of antibodies in the blood may increase the tendency to severe allergic reactions, when the serum is given intravenously at the end of the first week or later in the illness. If the physician should wish to supplement the intrathecal doses, intramuscular injections possess the advantage of seldom causing reactions of this kind, and are doubtless almost as effective as intravenous doses.

Intracisternal route.—Of late years, and particularly in the United States, the method of injecting the serum into the cisterna magna—the subarachnoid space bounded by the inferior surface of the cerebellum, the posterior surface of the medulla, and the occipito-atlantal ligament—has been employed to a considerable extent. It appears to be free from danger, but should

not be undertaken without previous practice on the cadaver. The introduction of serum by this route is believed by some physicians to be necessary when the condition of spinal subarachnoid block exists. The condition is most often due to the presence of a thick exudate in the spinal canal, or to subarachnoid adhesions. It may be diagnosed when only a few cubic centimetres of an extremely purulent fluid which has a low pressure are obtained by lumbar puncture, and when at the same time a copious flow of fluid under tension is obtained by cisternal puncture. Ebaugh prefers alternate injections of the serum by the cisternal route and by lumbar puncture; eight patients who were in an extremely critical condition on admission to hospital were thus treated, and five of them recovered. If the cerebrospinal fluid is fibrinous, the subarachnoid space should be irrigated with Ringer's solution by flushing the space through the needle in the cisterna, and also by allowing the solution to flow between the needle in the lumbar theca and the one in the cisterna. Some regard cisternal puncture as an easier method in competent hands than lumbar puncture, and think it is better tolerated by the patient. To a patient with fulminating meningitis he gave fifteen injections, the total dosage amounting to 219 c.cm.; of these injections eleven were cisternal, three spinal, and one intravenous; complete recovery followed. A series of 69 cases, with a fatality rate of 17.4 per cent has been reported by Fox; patients with the fulminating form of the disease who died within a few hours of admission to hospital are not included in the series. The average amount of serum given to each patient was 190 c.cm.; 19 per cent of the total amount of serum administered was given intravenously, 24 per cent intramuscularly, 24 per cent intrathecally, and 33 per cent intracisternally. There was an average of five lumbar and five cisternal injections for each patient.

A comparison between the results of serum treatment by the cisternal and the usual lumbar route has been made by Goldman and Bower. They treated 48 patients by the lumbar route with a fatality rate of 52 per cent; and 43 patients by the cisternal route with one of 25.5 per cent; patients who died within 24 hours after their admission to hospital are not included in these figures.

Some workers believe that thorough irrigation of the spinal canal with saline is a valuable adjunct to serum treatment and that the additional trouble is justified by the improved results which follow. Thus Whittingham and his colleagues preferred this plan to the method of producing an increase in the intrathecal pressure by giving a general anaesthetic, as recommended by Flaek, and were impressed by its beneficial effects in toxic and comatose patients.

Intraventricular route.—This method has not been much used, and it is doubtful whether the results are encouraging. Neal prefers the ventricular to the cisternal route when there is obstruction to the flow of the cerebrospinal fluid; she hopes by this means to avoid the risk of pressure upon the medulla. A large experience of cerebrospinal fever in New York has led her to advise the very cautious introduction of the serum by lumbar puncture when, owing to a spinal block, there is no flow of fluid; if this plan does not succeed, resort may be had to ventricular puncture. She favours conservative rather than such intensive methods of serum treatment as intrathecal injections given every 8 or 12 hours, or injections by other routes. In young infants ventricular puncture is best performed through the anterior fontanelle. Lyon thinks he has obtained good results by introducing serum into the ventricles and at the same time withdrawing fluid from the spinal subarachnoid space; the method is particularly useful in infants with a patent anterior fontanelle.

THE SERUM TREATMENT OF CEREBROSPINAL FEVER IN INFANTS AND YOUNG CHILDREN

Opinion is unanimous that the disease is almost always fatal in infants less than one year old, when serum is not

given to them. Among the large number of cases of meningococcal meningitis observed by Neal and Jackson in New York there were twenty-five among infants within the first three months of life. The treatment included daily injections of serum by the lumbar route, and, when there were definite signs of block, ventricular or cisternal injections were also given; of 23 of these patients, eleven died (47.8 per cent). McLean and Caffey treated 11 children, who were suffering from the sporadic type of the disease and who had symptoms of obstruction of the subarachnoid space, by introducing serum into the ventricles and the cisterna; eight completely recovered. On the other hand, McKhann found that, although the symptoms often diminished in severity when serum was given alternately into the ventricles and into the lumbar subarachnoid space, death ultimately followed from chronic hydrocephalus. Benjamin recommends early intensive treatment by the intravertebral routes combined with intravenous and intramuscular injections.

The tendency of the present time is to pursue energetic treatment in critical cases. For example, Peet gives details of the treatment of a girl, aged eight years, to whom 790 c.cm. of serum was administered: 560 c.cm. by eighteen lumbar punctures; 155 c.cm. by six cisternal punctures; and 75 c.cm. by four ventricular punctures; the child made a perfect recovery. In the opinion of this author cisternal and ventricular punctures and injections will do much to prevent hydrocephalus. The benefit derived from injections by these routes may conceivably be due in part to the drainage of the cerebrospinal fluid, and this makes it difficult to apportion the share of each factor in the final result. That drainage of the fluid may do good apart from serum treatment is shown by the case of a child of five months who was under the care of Mackay; she performed twenty-one ventricular punctures, from 50 to 100 c.cm. of fluid being withdrawn at each puncture, the last on the fifty-third day of the illness. A considerable leak took place on one occasion through the puncture wound, and from that time the condition of the child began to improve and the circumference of the head to diminish. A method has been reported from Germany which gives further evidence of the tendency to institute drastic treatment for the disease in children. In brief, it consists in removing as much as possible of the cerebrospinal fluid by lumbar puncture and replacing it by air. Warmed serum is then injected until air can no longer be aspirated. The advantages of the method are said to be the removal of the infecting organisms with their toxins and the circumstance that the serum escapes dilution by the cerebrospinal fluid, and is thus enabled to come into better contact with the affected portions of the brain and the spinal cord.

The Treatment of Pruritus Ani

By H. deLISLE CRAWFORD, M.D., M.Ch., F.R.C.S.I.
(From the *Practitioner*, Vol. CXXXI, No. 5,
November 1933, p. 621)

THE following treatment for this most distressing condition is based on the principle of keeping the area as dry as possible and employing effective and non-irritating antiseptics:—(1) As an aperient liquid paraffin only; (2) after evacuation and at regular intervals thorough cleansing with cold water and coal tar soap; (3) thorough drying with a soft towel; (4) introduction of a little adrenaline ointment into the anal canal if piles are present; (5) a teaspoonful of 1-1,000 acriflavine emulsion in paraffin rubbed gently into skin; (6) as soon as irritation is checked talc powder of any good brand is used freely instead of acriflavine.

Almost every case I have seen in the past year has yielded in a few days to this treatment and has been cured within a fortnight; one case has lasted

a month but none were of longer duration though quite severe. To get results quickly the various details must be carried out with the greatest care and patience.

The Choice of an Anæsthetic in Complicated Obstetrical Cases

By SAMUEL JOHNSTON, M.A., M.D.

(Abstracted from the *Canadian Medical Association Journal*, Vol. XXIX, October 1933, p. 399)

Heart lesions.—Heart lesions seldom veto the giving of a general anæsthetic, but these cases require careful selection of the drugs and methods used. In mitral disease, if the pulmonary circulation is interfered with and œdema, cough, dyspnoea or cyanosis are present, nitrous oxide and oxygen with a high percentage of oxygen would be the anæsthetic of choice, with pre-medication with atropin. Although I am not an advocate of chloroform, a mixture of chloroform and ether, supplemented with oxygen, might be used in these cases. The presence of a mitral murmur, with no evidence of failure of compensation, would not contraindicate nitrous oxide and oxygen and ether. One must not forget however that in all pulmonary disease, whether it is a primary condition or a result of mitral disease, the administration of ether over a long period of time may lead to œdema of the lungs. Mitral stenosis is always a serious complication, and faulty administration of the anæsthetic may lead to dilatation of the left auricle. My choice here would be ether and oxygen, if there are no contraindications, or rectal oil-ether anæsthesia.

In aortic disease, anæsthesia should be induced with the greatest care, avoiding struggling or excitement. Pre-medication should be given in these cases, 1/6 to 1/4 gr. of morphine with 1-200 gr. of atropin, administered three-quarters of an hour before the anæsthetic. If morphine is contraindicated, 1/12 gr. of heroin may be used. Nitrous oxide and a high percentage of oxygen for induction, sustained by ether by the drop-method, is the preferable anæsthetic in prolonged operations. For short anæsthesia nitrous oxide and oxygen with ether may be used throughout. It is all-important that cyanosis does not occur. It must be remembered that these patients are liable to syncope when returning to consciousness and require great vigilance until they have completely recovered from the anæsthetic. They should not be allowed to sit up for some time, as should retching or vomiting occur there may be an alarming fall in the blood pressure.

Where there is cardiac decompensation in pregnancy it is well to keep in mind that blood-pressure findings are quite as important as the heart examination, for there is never return of compensation with a falling blood pressure. Also the amount of hæmoglobin must not be overlooked, as in anæmic conditions the oxygen-carrying capacity of the blood is reduced, making greater cardiac effort necessary. In the selection of the anæsthetic, the type and general condition of the patient, the position of the child, the condition of the cervix and the size of the pelvis must be considered. Not only the kind of anæsthetic but the amount necessary must be taken into consideration, with reference to the oxygen needs and the time required for operation. In this connection the length of the anæsthetic administered is very important, as the administration of nitrous oxide and oxygen for the time required for the performance of a Cæsarean section is much less dangerous for the patient than the shorter period of surgical anæsthesia necessary for a difficult forceps operation when the patient has had several hours of trying labour. In routine cases of decompensation, my choice of anæsthetic would be nitrous oxide and oxygen and ether with a high percentage of oxygen.

Where there are structural changes in the myocardium, such as myocarditis or fatty degeneration, the

anæsthetic danger is greatly enhanced, as an extra strain is imposed on the already weakened and diseased heart. In these cases, ether is the anæsthetic of choice, with a careful induction with nitrous oxide and oxygen. It has been my custom to use oxygen continuously with the ether. The danger lies in giving the patient too much ether. Hypertrophied or dilated heart conditions would call for the same treatment as I have just described.

In all abnormal heart conditions, care must be taken not to frighten the patient by putting the mask on the face too quickly, or using too much concentration of the drug employed for anaesthesia. Have the drug well diluted with air or oxygen, proceeding slowly with the administration. Cyanosis must be avoided.

Tuberculosis of the lung.—In these cases the air passages must not be irritated or the respiration or circulation stimulated more than can be helped. The greatest possible care, therefore, must be taken both in the choice of an anæsthetic and in the method of administration. Ether is contraindicated. Nitrous oxide and oxygen, with some form of pre-medication—morphine and atropin, or heroin and atropin, with the addition of nembutal with nervous patients—is the anæsthetic of choice. Spinal anaesthesia would be my second choice, with pre-medication the same as before nitrous oxide and oxygen. Chloroform would be my third choice, but with this drug no previous medication would be used.

Diabetes.—Here chloroform should be avoided, but if for some reason it has to be given, the dosage should be light, and if possible oxygen should be administered with it. The anæsthetic of choice in diabetic cases is nitrous oxide and oxygen. Spinal anaesthesia is often used with excellent results. Where nitrous oxide and oxygen is given, some pre-medication is usually necessary—morphine, heroin or nembutal, or a combination of nembutal and one of the other two drugs.

In spinal anaesthesia, usually smaller doses are required—50 to 100 mill. novocaine. With operative procedure, a larger dose of the spinal anæsthetic is necessary, and the same pre-medication as for nitrous oxide and oxygen anaesthesia may be required. The site for injection of the spinal anæsthetic in these cases is preferably between the third and fourth lumbar vertebrae.

Ether may be given if nitrous oxide and oxygen or spinal anaesthetics are not available. This drug must be carefully administered so as not to saturate the patient with it. Ether should always be given by the open method in these cases, as otherwise the patient is liable to develop acetonæmia or acetonuria. Where possible, oxygen should always be administered with ether.

Hæmorrhage.—My choice of anæsthetic in case of hæmorrhage is nitrous oxide and oxygen, with if necessary the addition of ether. In these cases the carrying power of the blood is greatly lessened and a high percentage of oxygen is necessary. Where respiration is embarrassed 5 to 10 per cent carbon dioxide should be administered at intervals with the oxygen. These patients take ether with oxygen added fairly well. It is the duty of the anæsthetist to see that remedies such as glucose and saline are ready to be given intravenously, and, in severe cases, preparation for transfusion should also be made.

Toxæmias.—The more important toxæmias are: eclampsia, pernicious vomiting, chorea gravidarum, hydræmia and albuminuria.

Before the administration of the anæsthetic it is very important that one should satisfy oneself that the stomach is empty, and often a lavage of the stomach is necessary; a mild sedative is very helpful to enable this to be done. Chloroform should be avoided, on account of its narrow margin of safety in regard to respiratory and cardiac paralysis. It often leads to necrosis of the liver. Ether is much safer than chloroform but it is not the anæsthetic of choice. Nitrous oxide and oxygen, in the hands of those who

know how to administer it, is the safest anæsthetic for mother and child. To this, a small amount of ether may be added if more relaxation is required.

Spinal anaesthesia is also to be recommended, though it is contraindicated in cases with very high or very low blood pressure and when patients are exhausted from hæmorrhage or pernicious vomiting, or when there are other contraindications. In spinal anaesthesia the uterine contractions seem to be lessened or abolished, in which case, pituitrin is given. If the spinal injection is too high it affects a large number of the white rami communicantes of the cord, and thus more completely blocks the efferent inhibitory impulses of the sympathetic ganglia. The spinal anæsthetic should be given between the third and fourth lumbar space.

In an eclamptic condition 20 cubic centimetres of 10 per cent magnesium sulphate has greatly aided the anæsthetist and has been used with good results. I might add that in many of these complicated obstetrical cases a local anæsthetic, either alone or with the addition of nitrous oxide and oxygen could be used with good results.

After all, while we may lay down a general principle in handling these cases, each must be dealt with on its individual merit, and it seems to me that the ultimate result depends not only in the choice of the anæsthetic agent used and the technique employed but also on the skill of the anæsthetist and his co-operation with the obstetrician.

Carbon Dioxide and Oxygen in Obstetrics

By W. T. McCONNELL, M.D.

and

RONALD L. McCORMACK, M.D.

(Abstracted from the *Journal of the American Medical Association*, Vol. CI, 2nd December, 1933, p. 1783)

CURRENT literature teems with the controversy between a group of investigators who contend that carbon dioxide is superfluous and harmful to the asphyxiated newborn infant and another group who claim that oxygen alone is not entirely adequate for resuscitation of asphyxia neonatorum. It is our conclusion after clinical investigation and diligent perusal of the literature that both groups are right as far as they go but that the common ground between them, the use of adequate and intelligently varied mixtures of carbon dioxide and oxygen, will give the desired result in resuscitation when nerve cells of the centre have not been deprived of the minimum supply of oxygen and carbon dioxide for the maintenance of foetal existability.

Three years of oxygen administration (1928—31) with some means of artificial respiration failed to decrease the mortality rate in the asphyxias or to overcome atelectasis, the forerunner of pneumonia. Carbon dioxide alone was obviously not used; but the use of variable mixtures of carbon dioxide and oxygen, from 5 to 30 per cent of carbon dioxide with a full complement of oxygen, for the past two years in our practice of obstetrics and treatment of the newborn enables us to say that we have not failed to resuscitate a single asphyxia patient except one with cerebral hæmorrhage and one with a congenital abnormality of the heart. Both infants were premature. We have had no atelectasis that was not easily controlled with the mixtures and have had no subsequent bronchitis or pneumonia. Similar treatment of the newborn in the obstetric service at the Louisville City Hospital, for the past year has yielded equally good results in respect to neonatal pulmonary complications.

An understanding of the physiology of respiration and the pathology of asphyxia is a prerequisite to the intelligent administration of the gases, and the results are in direct proportion to the degree of such understanding. The ready-made mixtures of 5, 7 or 10 per

cent of carbon dioxide with their complement of oxygen are safest for the average physician, but they cannot be applied with success in all cases, for we have found that, as a rule, the greater the degree of asphyxia and lowered excitability of the centres, the higher the percentage of carbon dioxide necessary for stimulation. The classic differentiation of asphyxia, livida and pallida, are examples, the pallida being simply a greater degree of asphyxiation and requiring higher percentages of carbon dioxide for stimulation. The laryngeal reflex used as a means of distinguishing the degree of asphyxia has never been used by us, as we feel that it is a waste of time. It is easy to insert a tracheal catheter if response to the mixtures of 20 or 25 per cent carbon dioxide is not shown within a few seconds. When mixtures above 5 per cent are used they must gradually be lowered as response increases, so that the respiratory efforts of the child will be stimulated only slightly above normal action. The mixtures should never be given strong enough to cause a gasping, struggling, straining type of respiration. The objective symptoms are the guide, and the nearer the normal respiratory rate the treatment can be carried out, the longer it can be kept up and the more oxygen can be furnished to the tissues.

It has always been our idea to use carbon dioxide as a vehicle for oxygen supply to the tissues. Coryllos has shown that oxygen passes more quickly from the air sacs to the blood when a small percentage of carbon dioxide is present.

Our routine neonatal treatment of premature infants includes the administration of 5 per cent of carbon dioxide and 95 per cent of oxygen into a tent for a few minutes three times a day. The length of time of each treatment is determined by the respiratory response of the patient, but the average is about fifteen minutes.

The development of shock during anaesthesia and following the emptying of the uterus is mainly due either to the anaesthetic or to fatigue, or to both. The cause in both instances is ultimately the same, for to the acidosis and paralysing effect of the anaesthetic is added the increased lactic acid production of the maternal tissues with displacement of carbon dioxide from the base.

If the degree of acidosis is sufficient to produce a mild degree of shock with splanchnic endorsement, an insufficient amount of oxygen and carbon dioxide is supplied to the uterine muscle to oxidize its excessive load of lactic acid. A local acid base imbalance remains and increases in the smooth muscle cells with subsequent shock and loss of tone of the uterine muscle, and postpartum hemorrhage then occurs.

All of the mechanical methods of control of postpartum hemorrhage cause an ischemia of the uterine muscle, thereby defeating any possibility of immediate restoration of function. Therefore the treatment of postpartum hemorrhage resolves itself into the treatment of shock. The administration of carbon dioxide and oxygen, by decreasing the primary acidosis, elevates the general nervous tone and accelerates circulation, thereby re-establishing normal tone and function of the uterine muscle.

In shock due to anaesthesia, the administration of carbon dioxide and oxygen stimulates the respiratory centre, causing an increase in respiratory depth and rate, thereby furnishing more oxygen to the haemoglobin, relieving acidosis, stimulating the heart muscle, accelerating circulation and elevating tissue tone.

Something more than one year ago our attention was called, in a rather unique manner, to a possible effect of carbon dioxide inhalations as a stimulant to uterine contractions during labour. A private patient who had been having a prolonged first stage with weak, irregular contractions was developing uterine inertia. We thought it likely that she was having a fatigue acidosis and decided to administer several inhalations of carbon dioxide and oxygen to see what clinical effect we would get in combating the fatigue.

After a few inhalations we noticed that the uterus began a good contraction, followed by adequate relaxation. After this contraction, we gave the patient a few more inhalations and were gratified to see the contractions occurring with good regularity and force. Our impression was that the carbon dioxide had stimulated normal uterine contractions with normal relaxation periods. Recognizing the possibility of these phenomena being coincidental, we employed the same procedure in every case of inertia and found a uniformity of response that removed any reasonable doubt as to its effect as a stimulant. Further observations substantiated our results.

Among the inertia patients at the City Hospital were a number who had received caudal anaesthesia, and in these the response was much slower. Our best results were obtained in inertia caused by fatigue or that developing in connection with the administration of such drugs as morphine, sodium amytal, nembutal and chloroform.

As soon as it seemed fairly well established that carbon dioxide actually did have a stimulating effect on uteri suffering from inertia during labour, we decided to employ it in those cases of excessive bleeding due to inertia following the expulsion of the placenta. Ordinarily there will be only normal bleeding if contractions during the third stage have been strong enough to expel the placenta spontaneously. But there is a certain percentage of cases in which some degree of shock occurs after a physiologic third stage, owing to relaxation of the patient following prolonged, tiring labour, or associated with some form of anaesthesia. The degree of shock in most of these cases is so slight that the relaxation of the uterus is the only clinical evidence of depression; or it may rarely become sufficiently severe to have the clinical picture of surgical shock. We feel that, from our observations this mild form of shock is the cause of more postpartum hemorrhage than has hitherto been thought.

In our private work we have adopted the plan of administering a few inhalations of carbon dioxide and oxygen immediately following the expulsion of the placenta and have had no undue bleeding from the placental site in any of these cases in two years. In the City Hospital we have, for the past several months, employed carbon dioxide and oxygen inhalations as a routine in all cases of profuse bleeding from the placental site following the expulsion of the placenta. Records on twenty-five such cases show uniformly good results.

In two cases a certain degree of shock was a demonstrable complication of the bleeding, and in another a toxic condition with acute pulmonary oedema accompanied the hemorrhage.

In a certain percentage of cases of eclampsia the toxemia becomes so severe that a paralysing effect on the cardiovascular system takes place, with the result that the elevated blood pressure drops rapidly to far below normal limits, the pulse becomes very rapid and thready, and pulmonary oedema quickly develops. The patient becomes cold and sweaty, the respirations become slow and shallow, and she dies of the depressive influence of the toxin. We have employed carbon dioxide in five cases of this type with prompt recovery in three. In the two cases in which death resulted, autopsy showed a severe coexistent infection, in one case a well established pneumonia and, in the other, liver abscesses. Both patients had developed postpartum eclampsia in the home and were brought into hospital after a long delay.

Abdominal distention following Caesarean section is due to shock, paralysis of the splanchnic nervous system, loss of smooth muscle tone and decrease in local circulation. Pressure in the intestine aggravates the condition. An increase in carbon dioxide tension has long been known to stimulate smooth muscle activity. Therefore one would expect the administration of carbon dioxide and oxygen to stimulate peristalsis and restore normal cellular function. We have found in our work that this hypothesis is borne

out by clinical results. Our records show that the gas mixture was used in sixteen consecutive cases with success.

CONCLUSIONS

1. From 1928 to 1931, oxygen therapy was applied to all the conditions described, without any appreciable change in morbidity or mortality.

2. Carbon dioxide and oxygen mixtures, when administered by the metric control system, have been adequate for the relief of asphyxia neonatorum, and atelectasis neonatorum and its sequelae over a period of two years.

3. Carbon dioxide and oxygen mixtures safely and promptly combated uterine inertia in the first stage of labour.

4. The classic mechanical treatment of postpartum hæmorrhage does not stand up under physiologic investigation. Hæmorrhage is evidently due to postpartum acidosis of the uterine muscle. Carbon dioxide and oxygen controlled twenty-five consecutive cases.

5. The abdominal distention following Cæsarean section was promptly relieved in sixteen consecutive cases, even after thirty-six hours' duration in one instance.

6. The practical points in symptomatic administration are that treatment will usually be started with mixtures of between 20 and 30 per cent of carbon dioxide with oxygen. This high percentage is only for stimulation of the respiratory centre and must be promptly reduced, after a few inspirations, to the percentage that will maintain a normal or slightly higher respiratory rate. Strict regard must be paid to the fact that even 5 per cent of carbon dioxide and 95 per cent of oxygen will overstimulate in some cases and should then be used for only a few minutes at a time.

Treatment of Leprosy

Abstract Reviews

(Abstracted from the *Prescriber*, Vol. XXVII, 1933, No. 11, p. 349)

DISCUSSING the modern treatment of leprosy, Cochrane (London) says that the first question to decide is whether a case is one which will benefit from treatment. Modern developments indicate that the disease is self-healing. Like tuberculosis, leprosy may become arrested at any point, and it is essential to recognize the signs of activity. Active cases are those in which there are clinical or microscopical evidences of progressive or of recessive changes in lesions, with or without accompanying systemic disturbances. These evidences include: positive bacteriological findings in skin or mucous membrane; the presence of raised or erythematous lesions; increase or diminution of lesions in size or number; tenderness of nerves, with or without thickening. Before one can treat leprosy with any hope of success it is essential first to treat any other disease that may be present. Modern treatment of leprosy is based on the specific action of hydnocarpus (chaulmoogra) oil, which may be used in several forms: (1) iodized or creosoted esters; (2) alepol; (3) plain oil with creosote. The choice depends chiefly on the cost of the remedy and the ease in obtaining it. In early nerve cases the drug is injected subcutaneously or intramuscularly in doses beginning with 2 cubic centimetres and rising by weekly injections to 12 cubic centimetres. Cutaneous leprosy presents more difficulties, and here again the method of choice is the esters of hydnocarpus given intradermally. Lepa reaction, the condition caused by the breaking down of leprotic foci, is met by stoppage of injections, giving a purge, and administration of tartar emetic. Eye reactions demand care in general treatment and the use of alkaline washes. Gold preparations have a

limited place in treatment, and of these solganal B is preferable.

Strachan (Basutoland Leprosy Colony) reports on treatment with chaulmoogra oil. So much of this treatment, he says, has been inadequate that little can be said for or against it. The percentage of arrests in early cutaneous cases was only 21.43, while in early nerve cases it rose as high as 79.25. Over 50 per cent of early nerve cases recover without special treatment provided the patients are brought into a favourable environment, with good nutrition, hygiene, and physical exercise, the special treatment of predisposing or concurrent diseases (syphilis, etc.) being of prime importance.

Muir (Calcutta) emphasizes the greater activity of intradermal than of intramuscular injections in the administration of hydnocarpus preparations, the ethyl esters of which he prefers as they are less quickly absorbed. The esters are non-irritating when they are mixed with 4 per cent of creosote. If the oil is slightly warmed, it is possible to give a hundred punctures of about half a minim each, infiltrating some 5 or 6 cubic centimetres in an area of 14 square centimetres and when the oil is given in this way the initial reaction soon passes off. Lagrosa (Philippine Islands) describes a trial of weekly intradermal injections of iodized ethyl esters, and concludes that the local treatment of anæsthetic areas has definite value, return of normal sensibility occurring in favourable cases, with the advantage of possible prevention of neuritic changes.

The use of alepol, a sodium salt of the lower melting-point fatty acids of hydnocarpus oil (sodium hydnocarpate), is reported on by Dikshit (Vizagapatam Medical College). It has a less irritant effect than other preparations of hydnocarpus, and its hæmolytic action may be diminished by dissolving it in Locke's solution. In the early stages it is given by intramuscular injection (3 per cent); later the intravenous route is employed (1 and 2 per cent). The greatest improvement was seen in nerve and cutaneous cases; the cutaneous cases become stationary and improve very gradually, becoming bacteria-negative after a few months' treatment. Alepol is reported on favourably also by Bhandari (Gorakhpur), who finds it to be well tolerated and less irritating than other preparations of hydnocarpus. Badenoch and Alfred report on the use of alepol tabloids. These were given twice weekly, one the first week, two the second, and three the third. The tabloids were well borne, and gave good results, especially when combined with intradermal injection of iodized esters.

The pharmacology of alepol is the subject of a study by Dikshit (Vizagapatam). It has a low toxicity as compared with other soaps of hydnocarpus oil. It inhibits the growth of tubercle bacilli and exerts some toxic action on certain helminths. It has a marked hæmolytic action, which may be lessened by dissolving in Locke's solution, a process which also makes it less irritating. Large doses depress the cardiovascular system and stimulate respiration. Oral administration leads to gastro-intestinal irritation, but movements of the gastro-intestinal tract are little affected by intravenous administration. A study by Rao (Purulia Leper Colony) indicates that injection of any hydnocarpus preparation is followed in all types of cases by marked increase in the serum globulin.

A warning is uttered by Canaan (Jerusalem) to the effect that extreme care is necessary in the administration of potassium iodide, a matter which has been repeatedly emphasized in these reviews. In the hospital at Jerusalem it has never done anything but harm. The tubercles that form under its influence show an exceptional crop of bacilli, and he thinks it is too dangerous to be used at all. In a recent review (*Prescriber*, 1931, Nov., 381) it was stated that the dosage of iodides must be very carefully estimated, as the reaction, if severe, may cause further dissemination of bacilli.

The use of the organic salts of gold, solganal and solganal B, is recorded by Alfred (Leprosy Settlement, F. M. S.). Fifteen weekly doses ranging from 0.1 to 0.5 gramme were given in ten cases, solganal intravenously and solganal B intramuscularly. In cases known to react readily a desensitizing dose was given, and with this precaution the drug was found to be quite safe. The cases selected were those showing leprosy lesions of the eye, and the results were: improved six, no change four, worse one. The results appeared to be better in Chinese than in Indian patients.

Jackson (Bankura Leprosy Home) reports a study of the influence of hydrogen-ion concentration on pain reaction in the subcutaneous administration of sodium hydnocarpate solutions. He finds that there is no definite relationship between these factors, those having a low pH giving much the same results as those of high alkalinity as regards pain reaction. In another communication the same worker reports that addition of glycerine to solutions of sodium hydnocarpate for subcutaneous infiltration is of considerable benefit in reducing the pain reaction, which is liable to vary with different samples of the salt.

A new antimony compound has been tried in four hospital cases (two maculo-anæsthetic and two nodular) by Kingsbury (New York). This is 3 : 3-diamino-4 : 4-dihydroxy-arsenostibino-benzene, and is known as 'M 103'. It is soluble in water and has an acid reaction. Alkalinized by means of sodium hydroxide it forms a disodium salt, which is diluted with normal saline to represent 0.1 gm. in 10 cubic centimetres. This solution is given intravenously and is well borne. The first case was apparently cured; two cases showed moderate improvement, and in the fourth case the disease appeared to be arrested. Kingsbury thinks that this preparation is superior to the ethyl esters of chaulmoogra oil.

Mercurochrome has been tried in a number of cases by Muir and Chatterji (Calcutta). In many patients it effects marked improvement in dermal infections, pyorrhæa, bowel conditions, and general health, while its effect in relieving the lepra reaction is spectacular and often immediate. Mercurochrome should be given intravenously in 1 per cent solution, the dose for an ordinary adult being 3 cubic centimetres rising to a maximum of 10 cubic centimetres. Injections may be given once a week, but if no reaction occurs after the first dose 5 cubic centimetres may be given three days later. Benefit may be observed early in the course (five or six doses), but this is usually delayed until the maximum dose is reached. A flare-up usually occurs at the site of septic infection, but this passes off in a few days and becomes less with subsequent injections. Should any sign be observed of recrudescence of acute symptoms, apart from such reaction, mercurochrome should be discontinued; increase in the blood sedimentation rate is another indication for stoppage of the treatment. Mercurochrome is of no value in the treatment of leprosy itself; it merely removes concurrent infections. A similar report by Rao and Roy (Purulia Leprosy Colony) confirms these results in respect of certain concurrent infections.

The use of brilliant green is described by Ryles (India). He uses a combination of this dye with crystal violet, known as 'Bonney's blue', which has the following composition: brilliant green 0.5 gramme, crystal violet 0.5 gramme, alcohol 25 cubic centimetres, distilled water to 2,500 cubic centimetres. This is given by intradermal injection, in the same way as with hydnocarpus oil, in doses of 5 to 8 cubic centimetres. Should the injections prove painful, 1 per cent of procaine may be added. Of 211 patients on whom this treatment was tried, 125 were definitely better on brilliant green than on oil; 19 did better on oil; 29 were equally benefited by both, and 28 were not improved by either. There appear to be no contraindications to this dye treatment, and Ryles regards

the results as being at least as good as those obtained from hydnocarpus oil.

Treatment of leprotic ulcers by periarterial sympathectomy is described by Black (Singapore). He has performed this operation in fifteen cases of leprosy. The ulcers were on the feet and were all of old standing—from eight months to twelve years—and had resisted all ordinary methods of treatment. In every case the operation led to complete healing of the ulcers, the process taking from one to eight weeks. In six cases relapses occurred, but one soon healed with further rest in bed. The cause of relapse appeared to be the patients' habit of getting out of bed too soon. In the successful cases the ulcers have remained healed for periods ranging from four to fifteen months.

A Fatal Case of Phrenic Avulsion A Memorandum

By MAURICE CASSIDY, C.B., M.D., F.R.C.P.

and

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(From the *British Medical Journal*, 14th October, 1933, p. 684)

PHRENIC AVULSION is usually regarded as being a trivial operation. This particular patient was told that, though we could not promise him that the operation would improve his condition, we thought that it would probably do so, and that in any case the procedure was devoid of risk. We feel bound to put this case on record, demonstrating as it does that phrenic avulsion is by no means devoid of risk. A preliminary postural drainage or bronchoscopic lavage would probably have saved this patient's life.

The patient, a lorry driver, aged 23, suffered from bronchiectasis following a post-operative bronchopneumonia two years ago. He was expectorating about a pint of fetid sputum daily, and had lost 3 st. in weight. On admission on 15th August, 1932, he weighed 7 st. 5 lb. There was marked clubbing of the fingers, and the physical signs suggested a gross bronchiectasis at the base of the right lung, with some involvement also of the left base, though to a less degree. These findings were confirmed by x-ray examination after intratracheal lipiodol. He was treated by inhalations of creosote, by postural drainage, and by bronchoscopic lavage; but his condition slowly and steadily deteriorated. On 16th January, 1933, phrenic avulsion was attempted under local anaesthesia, the operating table being tilted up so as to elevate the head and chest. The nerve was exposed in the neck and clamped, whereon the patient hiccuped once, and immediately became acutely dyspnoeic. After an abortive attempt to cough he lost consciousness. A tracheal catheter was passed at once and a considerable quantity of pus was aspirated. Oxygen was then blown in via the trachea, and the patient's condition slowly improved. The skin incision was rapidly closed, no attempt being made to proceed further with the operation. The patient was sent back to the ward, where he again became acutely dyspnoeic, and died before further aid could be given. At the necropsy there was found complete collapse of the lower half of the right lung. The trachea and the main bronchi contained much pus. There was gross bronchiectasis, involving the right lower lobe, with cavities the size of a walnut. There was a much less marked degree of bronchiectasis involving the rest of both lungs. Death was evidently due to asphyxia consequent on the sudden flooding of the whole bronchial tree by pus squeezed out of the bronchiectatic cavities in the right base when the right dome of the diaphragm made its rapid ascent.

The Cost of an Adequate Diet

(Abstracted from the *Lancet*, 25th November, 1933, p. 1215)

It has not been possible in the circumstances to reconsider the fundamental principles on which nutritional needs are generally estimated, and it is open to bold critics to say that these principles are unsound. If the classical physiological observations stand, however, the rest of the Committee's findings must be accepted in substance. They are based on an assumption that the adult male requires on the average 3,400 calories a day to keep body and soul in good working order; and this, it is true, exceeds most previous estimates by 400. On the other hand the report offers good reasons for the increase, and in practice the extra amount is made up from cheap carbohydrates which add little to the cost of the diet. In calculating the proportionate requirements of women and children the Committee adopts the scale laid down by E. P. Cathcart and A. M. T. Murray which enables one to express a family's needs in 'man-values'; for example, a husband, wife, and four children have the same calorie needs as 4.63 adult men. Calories, however, are not enough, even when seasoned with vitamins and minerals, and the Committee draws its conclusions from specimen diets which could in fact be tolerated by the consumers and have the necessary flavour of variety. Again, for children it rightly insists on a disproportionate supply of first-class protein and bases its estimates on an item of one pint of milk per day for every child from one to six years of age.

The specimen diets have been prepared as economically as possible, and the approximate cost of each is given. Prices, however, vary from time to time and place to place, and the Committee names no one sum that may be supposed to cover the weekly needs of the adult male. Instead it offers two scales of cost—one based on the prices ruling in a single locality (Stockton-on-Tees) during twelve months, and one (the B. M. A. scale) based on the prices current in a number of areas throughout the country during two weeks of last summer. The Stockton scale is the lower because Stockton—hard hit by the depression—is a very cheap market; but the difference is more apparent than real, since it is mainly accounted for by the purchase of flour instead of bakers' bread. In Northern towns the bread is made at home and the cost is thereby reduced; it should be noted, however, that the Stockton figures make no allowance for fuel. The following table gives the 'family coefficients':—

		COST PER HEAD PER WEEK (TO NEAREST 1d.)	
		Man-value calorie Coefficients.	B. M. A. Stockton scale scale
			s. d. s. d.
Adult male ..	1.00	5 11	5 0
Boy over 14 years ..	1.00	5 11	5 0
Adult female ..	0.83	4 11	4 2
Girl over 14 years ..	0.83	4 11	4 2
Child 12 and under 14 years	0.90	5 4	4 6
" 10 " 12 "	0.80	4 9	4 0
" 8 " 10 "	0.70	4 2	3 7
" 6 " 8 "	0.60	3 7	3 0
" 3 " 6 "	0.50	3 5	3 0
" 2 " 3 "	0.40	3 1	2 10
" 1 " 2 "	0.30	2 8	2 6

This table which really contains the main conclusions of the report, gives both scales, and it will be seen that the Committee holds that the lowest expenditure which will support both health and working capacity in the adult male is 5s. a week in Stockton and 5s. 11d. in the other areas studied. This is in line with previous

estimates, but the Table brings out even more emphatically the large needs of children. It has proved impossible even at Stockton prices to devise an adequate diet for a child at less than 2s. 6d. a week and the cost rises rapidly with age until the boy of fourteen reaches the adult level.

(Note.—The figures given in the report of the British Medical Association Committee on Nutrition are naturally not applicable in India; nevertheless we feel that this short summary, taken from an editorial note in the *Lancet*, will be of interest to our readers, even if only for purposes of comparison.—Editor, *I. M. G.*)

The Modern Treatment of Pyorrhœa

By A. T. PITTS, D.S.O., M.R.C.S., L.R.C.P., L.D.S.

(Abstracted from the *Medical Press and Circular*, 20th December, 1933, p. 558)

The term 'pyorrhœa alveolaris' in a broad sense may be taken to mean a chronic general infection of the supporting tissues of the teeth, leading to their eventual destruction. The implication in the term that a discharge of pus from the gum margins is the most important feature of the disease is of doubtful truth. At some stage in most cases there is a discharge of pus, but it is not invariable, nor is it necessarily the most significant feature. Perhaps the following definition might command a fairly general, though not unanimous approval: 'Chronic general periodontitis (pyorrhœa alveolaris) is a disease characterized by a progressive inflammation and ulceration commencing at the gum margin and invading the periodontal membrane. Concurrently with the destruction of the periodontal membrane there is a rarefaction of the alveolar bone. As the supporting tissues of the teeth become destroyed the teeth become gradually looser. At some stage of the disease there is usually, though not invariably, a discharge of pus from the pockets formed by the destruction of the periodontal membrane. Secondary changes of a necrotic or regressive character affect the cementum, dentine and pulp. In some cases the bone changes are of a progressive, rarefactive character throughout, but in other cases rarefaction may be replaced by sclerosis or production of bone with fibrosis of the gum, so that the teeth remain firmly implanted until a relatively late stage'. Such a definition describes the common sequence of the clinical features. One point of clinical interest emerges, which is that two main types of pyorrhœa can be recognized. In one the pockets are deep, and the progress of the disease is rapid. There is a good deal of tartar on the teeth. The gums are hyperæmic and dark in colour. They bleed readily, and are often tender. The patients are often young adults with narrow, slender jaws. There is often a history of nasal obstruction and mouth-breathing. In this type we may say that there is little sign of tissue resistance to the infection, and general symptoms of toxæmia are not infrequently present. In the second type there is a fibrosis of the gums which proceeds concurrently with the bone destruction, so that deep pockets are not formed. The gums may be normal in colour and free from tenderness. There is not much tartar present. The relative absence of pockets means that food and bacterial stagnation do not occur. The jaws are large, and the dental arches well found. The patients have a vigorous habit of chewing, and there is usually a good deal of wear of the teeth. Such patients may be in excellent health, with an entire absence of any general symptoms which could be referred to the oral condition. But in the end, though this may be long delayed, the bone destruction will outstrip the fibrosis of the gums, and pockets will be formed which permit of stagnation of food debris and bacteria. It is permissible to regard the fibrosis of the gums and sclerosis of bone as signs of tissue resistance. Clinically, the prognosis is good, and little treatment is required.

It is impossible to discuss the treatment of pyorrhea without some reference to its etiology. Much confusion exists, and theories abound, all of which have some plausibility, but lack convincing proof. Some authorities hold strongly that pyorrhea is local in origin. There is much to be said for this point of view. Yet it overlooks certain aspects which certainly suggest some general factor. All conditions which favour food stagnation undoubtedly predispose to pyorrhea. Thus, mouth-breathing, irregularities of the teeth, dietetic factors, spacing due to loss of teeth, defective fillings or crowns, and ill-fitting dentures—all of these may favour the onset of the disease. Yet it occurs in patients in whom none of these factors are present, while, conversely, local conditions unfavourable to oral hygiene may be compatible with a good condition of the gums. Other authorities would find the explanation in some general metabolic disturbance, which, co-operating with some local condition, determines the onset of pyorrhea. The views of F. W. Broderick have attracted considerable interest. He believes that the disease is primarily due to endocrine disturbance, which upsets the balance of calcium metabolism in the direction of lime saturation, and brings about a chronic alkalosis. This increases the calcium content of the saliva, and causes a diminution of the CO_2 content of the blood, leading to a deposition of calculus around the necks of the teeth, which in its turn is the actual exciting cause of the gingival lesions.

It is not possible to discuss further this vexed question in the limits of this article, but enough has been said to make it clear that the treatment of pyorrhea is to some extent empirical and directed to the amelioration of symptoms rather than a rational attack based on a proven etiology.

TREATMENT

It must be premised that cure in the sense of a restoration to the normal is not yet possible. Since the essential lesion is a destruction of bone and periodontal membrane, a restoration to the normal would imply a reformation of bone and a re-attachment of the periodontal membrane. There is no evidence that this is possible. This is not to say that with a more accurate knowledge of etiology and pathology a method of treatment may not be devised which will make such a complete cure possible; but at the present time we know of no treatment which can accomplish such a regeneration of tissue. It is true that a gingivitis in which the supporting tissues are not affected may be completely curable without permanent loss of tissues. Since many writers hold that pyorrhea starts as a gingivitis, in this sense it might be said that a restoration to the normal might occur. But the writer has always felt that this was an unfair attitude. Assuming that in every case of pyorrhea there has been an antecedent and initial gingivitis, yet the converse does not hold good that every case of gingivitis is the prelude to pyorrhea, for many cases of gingivitis occur which do not lead to pyorrhea. It is easy to claim to cure pyorrhea in this restricted sense, but it is essentially a deception, and in contrast with more modest claims suggests the possession of some form of therapy not generally known. But the writer must hasten to say that such claims usually proceed from loose thinking rather than from any deliberate intention to deceive.

In the present light of our knowledge the word 'cure' as applied to the treatment of pyorrhea means a stabilization, as permanent as possible, of the destruction of the supporting tissues of the teeth at the level they have arrived at when treatment commences. The disease may be arrested therefore, and since the term 'cured' is often used in this sense, it is legitimate to apply it to the treatment of pyorrhea, provided that its limitations be clearly understood.

There is a vast and ever-increasing literature devoted to the treatment of pyorrhea which reveals more clearly than anything else the inadequacies of our

knowledge. It is a sound principle to examine all methods of treatment of a disease in the light of general principles. When so examined it will be found that many new forms of treatment, for all their apparent novelty, are only fresh expressions of old principles.

The various methods of treating pyorrhea can be grouped under such headings as mechanical, surgical, medicinal, electro-therapeutic and immunological. It is safe to say that all the many methods which have been advocated fall under one or other of these headings. A simpler grouping would be those which destroy infection and those which promote drainage. A still further division of great importance is treatment carried out by the dentist and that carried out by the patient. Each is complementary to the other, and the absence of co-operation by the patient is fatal to success. It should also be emphasized that no one method is likely to be successful alone; it is the combination of various methods which is all-important.

MECHANICAL TREATMENT

The first thing which should be done in every case of pyorrhea is to scale the teeth thoroughly. It is essential to remove all tartar from the teeth, especially those particles which adhere to the roots, and are thus below the gum margins. If this be not done, all other treatment is a waste of time and money. This is far from easy and may necessitate several visits. A mere hasty removal of the obvious masses of tartar followed by a polishing of the teeth is useless. To be effective it must be a carefully planned procedure which demands patience and a delicate tactile sense.

MASSAGE OF THE GUMS

Following the scaling of the teeth, a course of massage of the gums should always be instituted. Rubber vibrators which can be used in the dental engine have been devised, but in the writer's view massage is essentially a form of treatment to be carried out regularly by the patient. A useful adjuvant is glycerine and tannic acid. The procedure is to wrap a piece of muslin round the finger and dip it in the glycerine and tannic acid. The gums should be vigorously rubbed both transversely and vertically, and on both surfaces. This should be done for a few minutes twice a day. A period of about three weeks is sufficient for the use of glycerine and tannic acid. It may then be replaced by a solution of salt and water, a teaspoonful of salt to a tumbler of water. This should form a permanent part of the hygiene of the mouth as practised by the patient. Massage acts by inducing a circulation of blood in the tissues, and promotes fibrosis of the gums. It is surprising how quickly it brings about an improvement. In two or three weeks it is quite common to find that the tenderness and tendency to bleed readily have disappeared; the gums lose their dark congested appearance, while their shrinkage is shown frequently by the presence of fragments of tartar deeply placed, which have become exposed like rocks by a receding tide.

TREATMENT BY DRUGS

The local action of drugs depends on their action as caustics, disinfectants, or astringents. Innumerable drugs have been advocated, and good results have been claimed for all of them. There is nothing to suggest that any drug has a specific action. Creosote and alcohol in equal parts and chromic acid may be taken as representative of caustics. Their usefulness, however, is evanescent. So long as pockets remain, stagnation must occur. Still, they have a place in the treatment of pyorrhea.

The disinfectants are even more numerous. Hydrogen peroxide acts as a mechanical agent, through the bubbles of oxygen removing debris, rather than as a disinfectant. Its use, however, is considerable. Most dentists have compressed air laid on in their surgeries, and it is a useful procedure to spray round the mouth and flush out the pockets with peroxide on each visit.

Iodine, mercurochrome and lysol are a few disinfectants which may be mentioned. Since spirochaetes in combination with the fusiform bacillus are often present in the pockets, the use of a preparation containing arsenic has been advocated by Kritechevsky and Séguin. But evidence that these organisms in symbiosis are the cause of pyorrhœa is lacking. While liquor arsenicalis may be useful, there is nothing to show that it acts as a specific. Ipecacuanha, or its active principle, emetine, has also been employed on the assumption that the *Endamæba buccalis*, which is often present, is ætiologically significant. Here, again, there is nothing to show that this is so. Specific therapy, therefore, does not exist, in spite of extravagant claims which are sometimes made for various remedies. Astringent drugs like copper sulphate and zinc chloride are useful in the early stage in order to promote shrinkage of the inflamed gums.

MOUTH-WASHES

It is perhaps not an exaggeration to say that the most important ingredient in most mouth-washes is the water. Their main purpose is to flush out the mouth and to remove debris. Claims that this or that drug will destroy bacteria found in the mouth may be true of experiments *in vitro*, but it is a fallacy to imagine that any antiseptic can be used in the mouth of such a strength that it will reduce the bacterial flora to any appreciable degree. Experiments which have been carried out show that any reduction is temporary, and quickly made up. When it is remembered that in pyorrhœa there are irregular pockets round the teeth lined with infected tissue, it will be obvious that the antiseptics used in a mouth-wash can only play a minor part in the treatment of pyorrhœa. But few patients will believe this; so that if only to inspire confidence, a mouth-wash containing some antiseptic is a useful measure. Astringent mouth-washes are useful however. A pleasant and effective example is Lavis, a Canadian preparation. Hydrogen peroxide (five vols.) is useful, as the mechanical flushing action is increased by the effervescence of the nascent oxygen. An ingenious apparatus called the Hygienator has recently been put on the market which embodies the principle of the 'Sparklet' syphon. A suitable solution containing CO₂ under pressure, to which hydrogen peroxide can be added, can easily be made up, and the fluid can be sprayed round the mouth under considerable pressure.

SURGICAL TREATMENT

Since all tissue above the level where bone and periodontal membrane is still intact adds nothing to the stability of the teeth, and merely allows stagnation, it would seem a rational procedure to excise this tissue and thus obliterate the pockets. For many years this has been a common procedure, giving excellent results. It should only be done after preliminary treatment to reduce inflammation, and to get the tissue into as healthy a condition as possible. The operation can be performed under a local anæsthetic. Small and very sharp scalpels must be used, and various useful types have been devised. Recently H. Stones has advocated gingivectomy on a more extensive scale. He excises a strip of tissue on both labial and lingual aspects, down to the level of the bone round all the teeth affected. This is a lengthy procedure, which according to Stones may take over an hour to perform. It can be done under a local anæsthetic, but obviously is much more severe than the excision of the pockets of a few teeth at a time, chiefly in the incisor and canine region. Good results are claimed for this treatment, which has the merit of being based on a sound pathology. But it must be emphasized that it does not replace other methods, such as massage and scaling, nor is it applicable to every type of case. Some operators prefer the cautery to the scalpel. Even more elaborate methods have been advocated in America, involving reflection of the gum and curettage of the

bone, but the writer remains sceptical of their advantage over methods less pretentious and severe.

GENERAL TREATMENT

It is highly probable that in many cases of pyorrhœa there are general factors of importance. But too little is known to enable us to use a therapy of a general character with much certainty. It has been argued that the local condition may be secondary to intestinal stasis, and that treatment devoted to the intestinal condition, such as the regular use of liquid paraffin, would be beneficial. Gottlieb recommends the use of Fowler's solution internally, commencing with five drops once daily for five days, and gradually working up by successive increases of five drops every five days up to thirty drops daily. The dose is then diminished gradually to five drops again. He believes that arsenic stimulates the growth of bone. F. W. Broderick, whose views have attracted much attention, believes that pyorrhœa is essentially a local reaction to a condition of alkalosis. He advocates the use internally of ammonium chloride. About two grains should be taken before breakfast. After a few days the reaction of the saliva should be tested, and the dose increased or diminished until normal salivary pH is reached.

ELECTRO-THERAPY

The action of drugs may be increased by ionic medication. Those who practice this method are enthusiastic in their belief in its value. It is claimed that a deeper penetration of the drug into the infected tissue of the pockets can be obtained by ionization. Such drugs as zinc chloride, tincture of iodine and eucal can be used. A few teeth should be treated at a time with a current ranging from one to four milliamperes. The electrode should be held in contact in one spot from one to three minutes.

VACCINE THERAPY

Many organisms are found in pyorrhœa pockets, but none of them fulfil the necessary criteria to be regarded as the specific cause. From this point of view vaccine therapy is empirical. Since, however, the streptococci present are in all probability the organisms responsible for the general symptoms which may be caused by a focal infection in the mouth, a vaccine may sometimes benefit the general health. But whether vaccines do any good locally is another matter. The general opinion at the present time is that vaccine therapy has little if any value in the local treatment of pyorrhœa.

THE EXTRACTION OF TEETH

No account of the treatment of pyorrhœa, however brief, would be complete without some reference to the extraction of teeth as part of the treatment. Space does not permit of a discussion of the points which will influence the decision to extract the teeth, or to treat the disease by conservative methods. But given the decision that conservative treatment is permissible, there is still a place for partial extraction as part of the treatment. Thus the removal of certain teeth so as to create spaces, will remove the stagnation areas and enable the remaining teeth to be kept clean without much difficulty. No rules can be laid down, for the decision as to whether the extraction of any teeth will improve the hygiene of the mouth must depend on the amount of bone destruction as evidenced by clinical examination and radiographs of the teeth.

TREATMENT BY THE PATIENT

The part played by the patient is of the utmost importance. Unless there is a whole-hearted co-operation by the patient, the best efforts of the dentist will only produce a transient improvement. A careful and regular ritual of oral hygiene must be practised. Cleaning the teeth, massage of the gums, the use of silk or wool to remove debris from round the teeth, the flushing out of the mouth with a mouth-wash, are all essential. Here is the real difficulty in the treatment

of pyorrhœa. So many patients mean well; they start off with enthusiasm, which soon wanes week by week, until a rationally planned ritual degenerates into a perfunctory toilet of the mouth. Their condition lapses until the next visit to the dentist awakens a fresh spurt of enthusiasm. But each time the improvement tends to be on a lower plane, until eventually the disease reaches a stage which makes extraction inevitable. There is perhaps no disease in which it is easier to bring about some improvement; but there are few diseases in which it is harder to maintain the improvement over any length of time.

The cry of the patient, like Naaman, the Syrian, is always for the waters of the Abanah or Pharpar, which will bring some miraculous cure. But the humbler methods, based on time-honoured principles of pathology, though less showy, still remain the sheet anchor in our treatment of pyorrhœa. Used intelligently and carefully by both dentist and patient, they will not accomplish miracles, but they will arrest the progress of the disease in a considerable proportion of cases.

Artificial Pneumothorax Treatment

By G. JESSEL, M.D. (Oxf.), D.P.H. (Manch.)

(Abstracted from the *Lancet*, 16th December, 1933, p. 1360)

ARTIFICIAL PNEUMOTHORAX has been steadily growing in popularity during the past few years, but it is still employed sparingly by some workers. Fishberg, with his vast experience in America, considers that hardly 5 per cent of tuberculous patients can be regarded as suitable for the treatment, while Henf has recently drawn attention to the misuse of artificial pneumothorax both clinically and administratively. Many favourable statistics have, indeed, been published, but it is difficult to obtain absolute proof by such means. In fact, it has been suggested by Shaw that an experience of statistical dimensions actually treated is practically impossible. One difficulty is that medical superintendents of institutions are seldom responsible for the treatment of patients on discharge, and often find it difficult to follow up their cases.

Artificial pneumothorax—the greatest advance in treatment since the inception of the sanatorium—is, in fact, a particular application of the fundamental principle of sanatorium treatment, *viz.* rest. By compression of the lung, through the introduction of air into the pleural cavity, local rest of the affected part is obtainable. In practice the possibilities of applying the treatment are limited. Severe bilateral cases have usually to be excluded, and in patients with less extensive disease the introduction of air is frequently impossible owing to adhesion of the diseased lung to the chest wall. The success of the treatment in certain acute forms of unilateral disease is often marked, but many types of case are unsuitable, and the majority of experienced workers agree that artificial pneumothorax should not be lightly undertaken. Apart from the duration of treatment (refills necessary at intervals for about three years), each individual patient requires special consideration, not only as regards suitability but subsequently before each refill.

SELECTION OF CASES

Recent unilateral cases with comparatively slight involvement of the opposite lung are particularly suitable, especially in young subjects. Some of the most dramatic results are seen in such patients. High fever disappears, sputum is lessened, and the condition steadily improves. Good results are also frequently obtainable in patients with more extensive lesions, dependent upon the amount of fibrosis and the closure of cavities, if present. On the other hand, patients with much fibrosis, and particularly those of middle age, should not be given artificial pneumothorax as they are apt to be made worse by it. The point as to how

long it is desirable to wait before induction is debatable. If a patient is doing well with bed-rest there is no advantage in initiating a form of treatment which, owing to its duration and possible complications, may prove troublesome.

There is an impressive weight of opinion in favour of a preliminary period of conservative or sanatorium treatment. Others, however, consider that the percentage of real recoveries would be increased if all cases with tubercle bacilli in the sputum and definite signs of unilateral disease had artificial pneumothorax induced at once, instead of waiting to watch the results of an actual period of simple medical treatment. My patients are invariably requested, as soon as tuberculosis is diagnosed, to remain in bed at home until their turn for admission to the hospital arrives, so that it is usually possible to reach a decision as to their suitability for artificial pneumothorax treatment soon after they are admitted, as a comparison can be made between the clinical and radiological evidence obtained on diagnosis and on admission after a period of bed-rest.

In the majority of cases bacilli were found during the course of the illness. Since the utilization of good skiagrams has, in combination with clinical evidence, placed diagnosis on a more satisfactory basis than obtained in pre-radiology days, it is not my practice to wait until bacilli are demonstrated in the sputum, as valuable time may thereby be lost. In fact, as will be shown later, the percentage of negative sputum cases alive after a given time was found to be twice as high in those who received artificial pneumothorax as in those where this was unsuccessful or abandoned.

It is convenient to subdivide possible cases of pneumothorax into classes representing degrees of suitability for this form of treatment. In this connection it is generally agreed that the extent of the disease should be considered with definite reference to the presence or absence of cavitation in the lung chosen for collapse, and the presence or absence of disease in the better lung, both founded on a combination of radiological and physical findings.

TECHNIQUE

The pneumothorax apparatus designed by Peter Edwards has been found simple, effective, and reliable. Treatment is given in bed at first, and subsequently in a special treatment-room, x-ray screening beforehand being the rule, with skiagrams at intervals. An injection of omnopon, gr. 1/6th, is given subcutaneously half an hour previously. Local injections of 2 per cent novocain with 1 : 100,000 adrenaline are given at the induction and before the first two refills, and are then discontinued. The first three refills are given at daily intervals; thereafter every other day, the period being gradually lengthened to a maximum interval of two to three weeks. At first, 300 c.cm. of air are given, and this may be increased to 500 to 600 c.cm. Small and frequent refills are preferred, as the result is more likely to be collapse of the diseased portions only (selective collapse) while, in addition, effusions tend to occur much less frequently than have been reported when big refills at long intervals (6 to 8 weeks) were in vogue. In my series effusions, requiring gas-replacement on one or more occasions, occurred in 20 cases.

Artificial pneumothorax is often advantageously combined with other forms of treatment and is, of course, superadded to the sanatorium regime of the hospital. In agreement with the experience of Burrell and others, sanocrysin has been found of benefit in some cases, where the disease has spread to the opposite lung, and the phrenicectomies performed by Mr. Morriston Davies on over 50 of my cases have also been found useful where the degree of collapse was slight or inadequate. (The word phrenicectomy is used to include cases where phrenic evulsion was done. The latter operation, which aims at a gradual evulsion of the whole of the nerve, has been latterly modified by Mr. Davies. He now removes a segment of the nerve

and divides such accessory phrenic nerves as can be found—phrenicectomy.) This operation avoids the risk of pain, injury to lung, or hæmorrhage, which may occasionally follow evulsion.

DISCUSSION

Artificial pneumothorax was attempted in 139 out of 487 admissions of definite cases of pulmonary tuberculosis—i.e., 28 per cent. A satisfactory collapse was obtained in 59 out of 99 T.B.-plus cases, and in 26 out of 40 T.B.-minus cases—i.e., in 17 per cent of the total cases admitted. The tables show that, of patients so treated, a considerable number of men were working or fit, and had lost their bacilli at the end of 1932. This disappearance of bacilli has a distinct bearing on public health, because thereby important sources of infection are removed. There is reason to believe that in my dispensary area more T.B.-plus cases are alive, relatively to the total number of tuberculous patients, than before the introduction of collapse therapy, and the impression that such patients live longer is thus strengthened. Their regular attendance at the dispensary for refills is noteworthy, and by their obvious improvement in health they help to raise the morale of their fellow-patients, both in hospital and as out-patients. This in itself is significant. The results in the T.B.-plus cases of artificial pneumothorax satisfactorily applied and in cases with fibrosis where this was impossible (but where in 19 out of 31 phrenicectomy was done) show a striking similarity.

It thus appears that we must regard artificial pneumothorax as but one aspect of collapse therapy, which includes phrenicectomy and, occasionally, thoracoplasty.

SUMMARY

(1) Artificial pneumothorax is a valuable adjunct to treatment in an appreciable, but limited, number of patients. It assists restoration to working capacity and leads to the disappearance of bacilli from sputum in a great many cases.

(2) The benefits of this treatment are thus not limited to the patient, but have an important bearing on prevention.

(3) Artificial pneumothorax is a form of collapse therapy and must be considered in relation to other forms. In cases unsuitable for this treatment good results are often obtainable from phrenicectomy.

(4) The favourable impression that patients undergoing collapse therapy create on the minds of their fellow-patients, both in hospital and at dispensaries, is an indirect testimony to the value of the treatment and incidentally is important as affecting the morale of the other patients.

(5) The results of collapse therapy suitably applied are often appreciably better in a given time than the results of treatment used to be without it, although the close supervision that is needed in connection with artificial pneumothorax must be given due weight in assessing the value of this special ancillary method of treatment.

Reviews

RECENT ADVANCES IN MEDICINE: CLINICAL LABORATORY THERAPEUTIC.—By G. E. Beaumont, M.A., D.M. (Oxon.), F.R.C.P., D.P.H. (Lond.), and E. C. Dodds, M.V.O., D.Sc., Ph.D., M.D., F.R.C.P. Seventh Edition, 1934. J. and A. Churchill, London. Pp. xvii plus 485, with 58 illustrations. Price, 12s. 6d.

If one is to accept the title of this book without comment, one must conclude that during recent years few advances in medicine have been made outside the laboratory, as it would be no exaggeration to say that 90 per cent of the book is devoted to laboratory methods, though admittedly the clinical application of the observations made thereby are never lost sight of. Another point that should perhaps be made clear, in view of the fact that this is the seventh edition of a book that was first published ten years ago, is that it does not confine itself to additions that have been made to our knowledge since the last edition was published, but includes advances that were 'recent' ten years ago when the book was first published. The subject is, however, brought completely up to date, and a number of additions and a few deletions have been made; the former amount to 100 pages and seven new figures.

Matter has been added regarding sex hormones, the vitamins, calcium metabolism, nephritis, diabetes, and anæmia, to name only a few of the subjects. A number of chapters have been re-written, and sections have been added on ketogenic treatment, uroselectan pyelography, the electro-cardiographic changes in coronary thrombosis, respiratory efficiency tests, the treatment with sancrysin, agranulocytosis and its treatment, and many other subjects.

It is a book of undoubted value to the specialist and the medical man working in a town. It will also help the country practitioner to keep in touch with modern advances and to show him the direction in which modern medicine is tending, but we doubt if it will be of much *practical* value to the latter class of reader. Take, for example, the colorimetric estimation of

hæmoglobin in the chapter on blood and urinary analysis; the method described necessitates the use of a Newcomer type of colorimeter which costs about two hundred rupees, so that to the practitioner with nothing but a faded Tallqvist scale this section will not give much help.

The book is quite up to the standard of its predecessors, and of this excellent series of publications.

L. E. N.

RECENT ADVANCES IN VACCINE AND SERUM THERAPY.—By Alexander Fleming, F.R.C.S. (Eng.), and G. F. Petrie, M.D. (Aberd.), 1934. J. and A. Churchill, London. Pp. x plus 464, with 5 illustrations. Price, 15s.

AFTER a very careful perusal of this book we have no hesitation in saying that this is one of the most important additions to the Recent Advances Series. The book is divided into two parts; part I, which deals with the prevention and treatment of diseases by means of sera and with the specific prophylaxis and treatment of virus diseases of man and animals, has been written by Dr. Petrie; part II, which gives an account of the prevention and treatment of diseases by means of vaccines, is by Professor Fleming. The authors have undertaken a careful survey of the present state of knowledge regarding the employment of vaccines and sera in the prevention and treatment of disease. In each section after a short reference to the methods of preparation of vaccines or sera the various problems connected with each particular disease are discussed briefly but lucidly. The prophylactic and therapeutic employment of vaccines and sera, their dosage and value are fully detailed. The gaps in our knowledge, where they exist, and ideal schemes of clinical investigations are fully discussed. The whole book has been so written that it will appeal both to the specialist and to the practitioner. The charge has often been made that the practitioner of to-day approaches the patient armed with a syringe and needle instead of the

stethoscope and it must be admitted that there is a great deal of justification for such a charge. There has been a growing tendency towards the indiscriminate use of vaccines and sera. The realization that the efficacy of vaccine preparations depends upon their antigenic components and the importance of bacterial variations in immunology, and that sera owe their therapeutic activity to the antibodies that they contain, will go far to put vaccine and serum therapy on a firmer, sounder and scientific basis. The book should be read by all practitioners of medicine, whether they are or are not convinced of the value of vaccine and serum therapy. To both a recent summary of the whole subject will prove of value and to those who desire further information a useful bibliography is given at the end of each chapter. The book is well written and the printing and general get-up are excellent.

C. L. P.

THE RADIOLOGY OF BONES AND JOINTS.—By James F. Braltsford, M.D. (B'ham), M.R.C.S. (Eng.). 1934. J. and A. Churchill, London. Pp. xx plus 500, with 310 illustrations. Price, 30s.

THE author of this book, well known to radiologists from his numerous contributions to current literature, is Radiological Demonstrator in Living Anatomy at the University of Birmingham. The fruits of combining radiology with instruction in anatomy are partially manifest in this excellent volume. It is a pity that more universities do not follow the example of Birmingham in this respect.

The book contains an enormous amount of information both on the normal skeleton including non-pathological variations and on the changes due to disease. Where the information appears to be restricted direct reference to the source of the information will always be found. The text and illustrations indicate that the work is based on vast personal experience and a bibliography of eighteen pages, arranged at the end of the book in a really practical manner, suggests a wealth of reading by the author and makes the book exceptionally up to date and authoritative. The radiographic reproductions are in all cases in the positive and are as fine as any the reviewer has seen in medical textbooks. Almost without exception they convey what is intended by the author in the text and where necessary line drawings are liberally used. The specimens given of some of the rarer diseases, such as Schmorl's nodes, vertebral angioma, Albers Schonberg's disease, are of the type likely to help a man who has not met with them before.

The book should prove a mine of information to the keen clinician and must for long remain an indispensable volume of reference in any radiological department. It is produced by the house of J. and A. Churchill and is another sound addition to their long list of successes.

H. R. R.

THE CHANCES OF MORBID INHERITANCE.—By Various Authors. Edited by C. P. Blacker, M.C., M.A., M.D., M.R.C.P. 1934. H. K. Lewis and Co., Ltd., London. Pp. xii plus 450. Illustrated. Price, 15s.

In expressing an opinion on this book, we find it extremely difficult to avoid a certain literary cliché, very dear to the amiable reviewer. It is the type of book which one opens thinking that one is treating oneself to a little luxury reading, and puts down with a feeling of wonderment that the general practitioner has been able to face the cross-questioning of his patients for so long without the precise knowledge on the subject of heredity and disease with which the reading of this book will equip him. It may be said that the information was available—somewhere. But it was certainly not to be found in the general run of medical literature, or anywhere, in this concise form.

Few titles of books are more completely self-explanatory, but, if any further explanation as to the scope of this book is necessary, this is provided in the first paragraph of the preface—'Its object is to supply to the general practitioner the means of dealing with a request for a eugenic prognosis'. The editor claims that space has been allotted to the various subjects in proportion as the practitioner is likely to be asked about them, rather than in proportion to the sum of our knowledge thereon; this in our opinion is not quite the case. We should have thought that the inheritance of cancer was one of the commonest subjects of popular enquiry, but the information given is particularly meagre. This is perhaps because knowledge on the subject is very limited; nevertheless, we found it the only disappointing chapter in the book. On the contrary mental deficiency, which has quite rightly been given a chapter to itself, and a long one, and which is probably one of the most important subjects from a racial point of view, does not, we should imagine, often form the subject of questioning for the general practitioner, though it is a matter of primary concern of the public health officer and the medical inspector of schools.

It is difficult to pick out any chapter for special mention, but the first chapter, on genetic principles, is probably the most important. We have not hitherto read an exposition of the modern views on Mendelian inheritance that has been so easy to follow. This chapter will form a valuable introduction to the study of genetic principles, not only for the general practitioner but for the student who proposes to make a special study of this subject.

The writer on the subject of heredity and tuberculosis seemed to the reviewer to make a mistake in taking up a defensive attitude. He suggested that ever since the discovery by Koch of the causative organism of this disease, too much attention has been paid to the bacterial aspect of the problem, and that the medical profession had tended metaphorically to spell 'tubercle bacillus' with a big 'B'. (We assume that it was countervailing influence that this writer chose to spell Tubercle with a capital 'T' throughout the chapter; but why did he write 'tubercular infection' when he meant 'tuberculous'?) The extreme expressions of opinion that he quotes are not typical of the general medical opinion to-day, nor did the pendulum ever swing so completely from the 'tuberculous' diathesis of our grandfathers as he pretends to believe. If emphasis has been laid on environment, it has been because it was more likely to produce results than emphasis on heredity. It is not much use telling tuberculous parents that they should not have had a large family, but it is often possible to get the latter away from their infectious surroundings. The case for differences in herd susceptibility is surely fairly generally accepted, and the writer did not seem to be able to make out any case for the inheritance of individual hyper-susceptibility. Nevertheless, this chapter was an interesting one.

The inclusion of a glossary of genetic and psychiatric terms was a good idea, but this might have been fuller with advantage. The pedigree schedule, devised by the Eugenics Society, which can also be obtained separately, should prove a valuable help to the medical man and relieve him of a good deal of personal investigation when a patient asks for a eugenic prognosis.

As we have said above, this book is an important addition to the practitioners' library; the social worker will also find it invaluable.

L. E. N.

METABOLIC DISEASES AND THEIR TREATMENT.—By Dr. Erich Grafe. Translated by M. G. Bolso. 1934. Published by Henry Kimpton, London. Pp. 551. Illustrated. Price, 32s.

THERE appears to be little doubt that the subject of the diseases of metabolism occupies an important position in the field of internal medicine of the present

day and it is pleasing to remember that continued and increasing attention is being directed by the medical profession towards the solution of this important subject. The keen interest which is manifested by research workers all over the world in trying to work out some of the difficult and intricate problems in certain nutritional disorders, and in such metabolic diseases as obesity, diabetes, etc., is really commendable. This has certainly helped to throw light on many of the hitherto-unexplored problems, helping towards a much better understanding of the subject as a whole.

This book originally appeared in the German language about two years ago, and the present volume, which has been completed since then and brought up to date, has been translated into English under the supervisions of people who may be considered authorities on the subject.

The book is divided into five parts with an appendix at the end. The first part is concerned with general discussions regarding metabolism and nutrition; part II deals with anomalies of nutrition and their dietetic treatment; in part III (which covers more than half of the book), the author has dealt with the two of the most important diseases of metabolism, namely obesity and diabetes, in an admirable manner. Its perusal will amply repay the reader for the time given to it. Part IV deals with diseases due to disturbance of protein metabolism, such as gout and cystinuria, and the last part of the book deals with disturbances of the water and mineral economy and includes diabetes insipidus. In the appendix, the author has dealt with the diseased conditions of general interest, such as calcareous diatheses, oxaluria, and phosphaturia.

We welcome this book not only because it is one of the few books which deal with these subjects in a clear, concise and precise form, but also because the book deals specifically with all the metabolic diseases in a way that is most useful both to the doctors and the students.

J. P. B.

A MANUAL OF DISEASES OF THE NOSE, THROAT AND EAR.—By E. B. Gleason, M.A., LL.D. (Lond.). Seventh Edition. 1933. W. B. Saunders Company, Philadelphia and London. Pp. 651. Illustrated. Price, 21s.

THIS is the seventh edition of this very useful manual. It has been revised and entirely reset.

So far as I know there is no book of its size in the English language which deals with all three subjects, i.e., ear, nose, and throat, so adequately.

The first fifty pages deal with the art of laryngoscopy, otoscopy and rhinoscopy. The descriptions are lucid and practical. There is a short description of some very useful accessory instruments such as Allen's probes, various atomizers and powder blowers, syringes, etc.

A short chapter on sterilization of instruments. And finally some hints as to examining patients and an easy schema for recording the results.

The rest of the book is divided into five sections, nose, pharynx, larynx, ear, and formulas.

Each section begins with a description of the anatomy of the part and the illustrations which accompany the text are taken from actual dissections made by Professor Gleason himself. They are all valuable and well reproduced.

The chapter on suppuration of the para-nasal sinuses has been very carefully dealt with. The author is strongly in favour of the more conservative methods which is also the modern trend in Great Britain and Europe. Nevertheless he describes the recognized radical operations on these sinuses fully, but at the same time he points out in the preface to this edition that the result is often to substitute one pathological condition for another, and that almost as much treatment is required to keep the patient comfortable as if no operation had been done. In one of the largest clinics in England they have not performed a Caldwell-Luc

operation for the last five years. A very large opening under the inferior turbinate was the operation of choice.

In the section on the pharynx the picture illustrating the line of incision for a quinsy is shown with the patient having his mouth wide open. This I suppose is necessary but the fact is not emphasized enough that in the acute stage an opening of a quarter to half an inch between upper and lower teeth is all that one gets unless a general anaesthetic is used. This to my mind is a strong argument in favour of tonsillectomy in the treatment of quinsy in the acute stage as soon as the abscess has formed. The trismus relaxes, almost at once under chloroform anaesthesia, the jaw falls open, and the rest is easy.

In the section on the larynx the operation of high tracheotomy is described. The cricoid and first rings of the trachea being cut either with a knife or scissors. The risk of stenosis of the larynx after cutting the cricoid is emphasized. I think it would have been better to have omitted the operation altogether. It is never necessary.

The fourth section of the book is devoted to the ear. It is by far the largest section. The illustrations are many and very well executed. In the opening chapter on the anatomy the author has succeeded in being brief and at the same time lucid, a combination by no means easy of attainment in this part of the body.

The fifth and last section is headed 'Formulas'. It is not a mere catalogue of prescriptions but has in addition therapeutic details and sometimes pharmacology as well, because the manner of use and the preparation of a remedy is often of more importance than the drug itself.

This section the student and the practitioner will find extremely valuable for local applications bulk so largely in the treatment of diseases of the ear, nose and throat.

The statement on page 239 that the fusiform bacillus and the spirochete of Vincent's angina are different forms of the same organism will not be generally accepted.

There are some half a dozen errors which are obviously due to the printer's devil. The other errors are I presume the American idea of how the English language should be spelt. These are only minor criticisms. The book amply fulfils its object as a manual for students and practitioners.

H. S. C.

THE ORIGIN OF CANCER.—By J. P. Lockhart-Mummery, M.A., M.B., B.C. (Cantab.), F.R.C.S. (Eng.). 1934. J. and A. Churchill, London. Pp. ix plus 150. Illustrated. Price, 10s. 6d.

THIS book is a detailed exposition of the genetic theory of the origin of cancer, sponsored by the author in 1932. It reviews the main facts and theories connected with the subject of tumours, evaluates the influence of heredity on tumour formation and explains at length the evidence in favour of the genetic theory.

Science is no longer prepared to accept the cell as a unit of life, nor the microscope as a determinant of the physical dimensions of that unit. The genetic theory of inheritance postulates genes as the ultimate units of life, the stability or mutations of which, as components of reproductive cells, determine the maintenance of fixed types or secure variations from the normal. Mr. Lockhart-Mummery visualizes the operation of a similar process in the case of somatic cells. He regards simple tumours the result of mutation of genes of rapidly dividing somatic cells, in individuals who have inherited a susceptibility for such a mutation and cancer as the result of yet another mutation in certain cells of simple tumours.

The author himself realizes that theories are always tentative and their value lies in the view afforded of a probable sequence of causes and results and the relative importance of ascertained facts.

What are the factors determining the initial and secondary gene mutations in somatic cells? The answer to this will probably come from experimental work and observations prompted by the gene theory of inheritance.

This book constitutes a notable addition to recent literature on cancer. Its style is lucid and avoids cumbersome technical phraseology so often used to lend dignity to commonplace ideas. The book is bound to interest all workers in the field of cancer research and genetics.

V. N.

THE CANCER PROBLEM AND ITS SOLUTION.—By H. Gifford, F.R.C.S. 1934. H. K. Lewis and Co., Ltd., London. Pp. II plus 60. Price, Cloth 2s. 6d.; Paper, 1s. 6d.

THIS book can be classed as being of the 'precious slender volume' type. It is, one must assume, published at the author's own expense, and in it he airs his own particular views. There is much in this book that is true, so true, in fact, and so frequently repeated that one wonders whether it was worth saying again. On the other hand there is much that, even if it cannot be called exactly untrue, is not the proven truth. Again, the book contains certain generalizations that cannot be accepted, as, for example, that 'tumours' occur in the young, cancers in the old. The nomenclature is the author's own; in this case he appears to use 'tumours' as meaning innocent neoplasms.

Reading the book as a serious contribution to science, as the reviewer did—at first, one gathers that the author's contention is that the causes of cancer can be considered as (a) exciting and (b) predisposing; the exciting causes are injury, chronic irritation, x-rays, etc.; the predisposing are embryonic 'rests' and pre-degeneration. But it is not until page 33, more than half-way through the book, is reached that the reader stumbles on the first clue to the *raison d'être* of the book; here he will find the following sentence: 'The answer to this all-embracing conundrum will appear later when we come to deal with cancer in its larger, more social aspects as a national punishment or scourge'. Even then he will have to be content with rather vague statements such as 'abundant and convincing evidence that our present degeneracy of mind and body is a source of disease', and he may feel that he has been cheated, as the reviewer did, when he is referred to another book (price 15 shillings) for more explicit details.

We must not conclude without reference to the outside of the book. The combination of black cloth, red paper and gold lettering has produced the most attractive case we have ever seen around a medical book; for this the publishers are to be congratulated.

We can recommend this book to any one with strong evangelical tendencies.

L. E. N.

RED BLOOD CELL DIAMETERS.—By Cecil Price-Jones, M.B. (Lond.). 1933. Humphrey Milford, Oxford University Press, London. Pp. 82.

SCIENCE is measurement; and therefore even since scientifically-minded man first saw in a drop of human blood the elliptical globules which we now call erythrocytes, three hundred years ago, he has wished to measure them accurately. This passion for accurate measurement of red cells is a character that has shown itself at frequent intervals in the succeeding generations of scientists during this period of three hundred years, but was repressed on account of the crudity of both the instruments and the standards of measurement that man had at his disposal, so that its presence was not evidenced by any degree of successful achievement until about 1880 when Malassez drew the first red-cell-diameter curve and gave the mean size of 100 cells as 7.7μ , after which this character seems to have been recessive in the next generation, to have appeared again, and to have achieved its maximum degree of expression

(if we may be allowed to prophesy) in the publication of the book under review.

Amongst the standards of measurement used by the early workers were grains of sand, grains of pollen, and the cross sections of human hair. In these circumstances it is surprising that some of the early attempts at measurement were sometimes so accurate; for example, Dr. James Jurin in 1718 came to the conclusion that the average size of the human red blood corpuscle was $1/3240$ th of an inch (or 7.75μ), but he spoilt this accurate achievement by making another attempt of which the result was 12.5μ (expressed in modern terms). Just over fifty years ago a writer in this journal discussed red cell measurements, and, though the method he advocated is the one in general use now, he suggested that only ten cells should be measured to obtain an average!

The author modestly describes the book as a reprint of articles on the subject of blood measurements that he has contributed to scientific journals during the last few years. Nevertheless, it will be looked upon as the standard book on the subject for many years, we predict. More than half the book is devoted to cell diameters in normal persons; the method of measuring the cells, of drawing the curve, and of calculating the means, standard deviation and coefficient of variation are given in detail; there is a chapter on diurnal variations; if one excludes the early morning reading, which has a mean of about 0.5μ below the mean of all other readings, these are not likely to introduce any error in judging the significance of mean diameters in cases of anaemia, and in any case the Price-Jones curve maintains its normal shape throughout the 24 hours, as well as after violent exercise or forced breathing, though in the former case there is an increase in the mean diameter and in the latter a decrease. As far as pathological conditions are concerned pernicious anaemia is the only one that is gone into in any great detail; this is not surprising as it is the disease on which the author has done most extensive research; however, there are chapters on anaemia following haemorrhage and on microcytic anaemia, and a number of sample curves in such conditions as sprue, aplastic anaemia and polycythemia are given.

Anyone making a serious attempt to investigate blood diseases will find that he is seriously handicapped without a copy of this book, which should certainly be in every medical library in the country.

It is an Oxford Medical Publication.

L. E. N.

APPLIED PHARMACOLOGY.—By A. J. Clark, M.D., F.R.C.P., F.R.S. Fifth Edition. 1933. J. and A. Churchill, London. Pp. x plus 632, with 73 illustrations. Price, 18s.

THE present edition of this book has to a great extent been rewritten. This change was rendered necessary by the increase of knowledge regarding the mode of action of drugs which has been obtained during recent years, and owing to the appearance of the 1932 edition of the British Pharmacopoeia, which forms a satisfactory general guide for selection of drugs for use in therapeutics.

That Professor Clark's book has gone through five editions in the course of a few years amply speaks of the great popularity and demand for the book. As indicated in the preface to the first edition, the author has aimed at bridging the gap between academic and experimental pharmacology on the one hand, and practical therapeutics on the other. In his attempt to do so he has widened the conception of the scope of pharmacology. His inclusion of x-rays, diathermy, electrocution and ultra-violet irradiation in pharmacology cannot be considered irrational on the ground that these are physico-therapeutic measures. There is ample logical reason for their inclusion and this broad outlook gives the book as a whole a unique value. Pharmacology has a direct relationship to physiology,

chemistry and pathology and a proper grasp of the subject is impossible without a knowledge of these sciences. Although the size of the book has prevented the author from giving detailed consideration to these aspects, a short abstract of the physiological and pathological problems concerned is given in all cases and is very helpful to the reader. Professor Clark's book is amazingly up-to-date and contains an account of all the recent investigations regarding the subjects concerned. The chapter on vitamins, the pituitary and sex-gland hormones are worthy of special mention in this respect. The pharmacology of iron salts in the treatment of anaemia is fully described in the light of modern research.

We cannot speak too highly of this volume and are of opinion that the book should be in the possession of all senior medical students in Indian colleges and of practitioners who wish to use drugs rationally. The get-up of the book is excellent and the publishers are to be congratulated on the moderate price of the book.

R. N. C.

MODERN INHALATION THERAPY FOR THE GENERAL PRACTITIONER.—By C. H. Auty, M.R.C.S. (Eng.), L.R.C.P. (Lond.). 1933. William Heinemann (Medical Books) Limited. Pp. vii plus 66. Price, 3s.

The author seeks to prove that the most satisfactory method of administering all drugs and even vaccines is by inhalation and that this method is not only suitable for conditions in which the vapour may come into contact with the diseased area, but also to all morbid states, on the grounds that the mucous membrane of the respiratory tract has more constant and greater absorptive power than that of the alimentary canal. This thesis is not easy to accept and the author does not advance sufficient evidence to warrant its consideration. Further his case is somewhat damaged by loose statements, such as that tuberculosis and rheumatism might be regarded as twin brothers. We find it difficult to believe that for diseases as wide apart as varicose veins and enlarged prostate, the administration of drugs by inhalation is the most appropriate method and we must confess that the author has not converted us to his views.

E. H. V. H.

MODERN CLINICAL PSYCHIATRY.—By Arthur P. Noyes, M.D. Messrs. W. B. Saunders and Co., Philadelphia and London. Pp. 486. Price, 20s.

The author states that this book is the outcome of lectures he delivered to small groups of senior medical students who elected to spend their vacations at the State Hospital for Mental Diseases at Howard, Rhode Island. The book is therefore one eminently suitable for students. The first four chapters are devoted to a few of the basic principles of psychology. The remaining twenty-four chapters deal with the mind in its manifold disorders. The author is happy in the possession of a highly gifted power of exposition and great clarity of expression. He is not didactic, but, at the same time, he does not exhaust the student reader with elaborate disquisitions on the innumerable riddles in mental pathology. The chapter devoted to paranoia and paranoid conditions is particularly worthy of attention. The complicated aetiology of general paresis in respect to its incidence among coloured, as opposed to non-coloured, races is not discussed. This is a great pity because the comparative freedom of Asiatic races, if not those of Africa also, still remains one of the most important of the unsolved riddles of psychological medicine. Each chapter ends with an appropriate bibliography so that any point that may arouse the particular interest of the reader can find further elucidation by reference to the publications cited for that purpose.

The views of the author on what he terms *sexual psychopathy* will probably undergo considerable modification as soon as he comes into touch with the remarkable contributions on this topic of René Guyon, the last of which, 'Sexual Life and Sexual Ethics', has recently been translated into English. Indeed, this criticism is the only one not entirely favourable to the book as a whole that can justly be made.

O. B. H.

THE CLINICAL EXAMINATION OF THE NERVOUS SYSTEM.—By G. H. Monrad-Krohn, M.D., F.R.C.P. Sixth Edition. Publishers: H. K. Lewis and Co., Ltd., London. Pp. xix plus 234, with 64 illustrations. Price, 7s. 6d.

Professor Monrad-Krohn's name has long been associated with neurology and his practical teachings set forth in this book are of great interest. Six editions within 12 years well indicate its usefulness and popularity. The book gives a well-balanced account of numerous clinical tests in neurology with excellent illustrations. The author first deals with the various clinical methods, which cover practically three-fourths of the volume. Then he writes about the electrical tests and cerebrospinal fluid examinations. Lastly, he gives a useful appendix containing outlines of mental examination, anatomical diagrams, pharmacological tests, radiography, etc. The chapters are concise, dogmatic and full of practical directions likely to be of greatest service to students and practitioners. The language is direct and simple and the matter is intelligible to anyone who knows his anatomy and physiology.

R. N. C.

URINARY INFECTIONS.—By C. Morson, O.B.E., F.R.C.S. 1933. John Bale, Sons and Danielsson, Ltd., London. Pp. 76. Price, 2s. 6d.

This recent addition to the Pocket Monograph Series will be welcomed by the practitioner. Within its 74 pages will be found a concise summary of the aetiology, pathology and symptoms of urinary infection together with a description of modern methods of treatment and investigation. The author stresses the importance of testing renal functions when the kidneys are attacked by infective processes, a point which is apt to be overlooked.

In the section on children we think that more prominence should be given to infections other than *B. coli*, and that the importance of tonsillar infections as a cause of pyelonephritis should be mentioned. Apart from this, the book will be found full of useful and essential information.

E. H. V. H.

MIGRAINE: DIAGNOSIS AND TREATMENT.—By R. M. Balyeat, M.A., M.D., F.A.C.P. 1933. J. B. Lippincott Co., Philadelphia and London. Pp. xvi plus 242. Illustrated. Price, 12s. 6d. Obtainable from Butterworth and Company (India), Ltd., Calcutta. Price, Rs. 9-6

The present unsatisfactory state of our conception and treatment of migraine is ample justification for the appearance of a volume devoted to this subject alone. The author has made an exhaustive and comprehensive study, beginning with researches into the hereditary factor and providing many illustrations of the well known fact that migraine is closely linked with other allergic manifestations. He is of opinion that migraine is in practically all cases due to a specific sensitization to one or more foods, though the inherited tendency is an ability to become sensitive rather than an actual sensitization.

The author is to be congratulated on the clarity with which the subject-matter is presented and the care with which the large mass of evidence is analysed. The book opens up new lines of thought and renews our hopes that the ineptitude of our present treatment of this disease may be replaced by the accurate

investigation and the cure of many hitherto intractable cases.

Finally, the opinions advanced are supported by a number of illuminating cases.

E. H. V. II.

PATHOGENIC MICRO-ORGANISMS: A PRACTICAL MANUAL FOR STUDENTS, PHYSICIANS, AND HEALTH OFFICERS.—By William Halleck Park, M.D., and Anna Wessels Williams, M.D. Tenth Edition. 1934. Baillière, Tindall and Cox, London. Pp. x plus 868. Plates 11, figures 215. Price, 35s.

The tenth edition of this well-known textbook on bacteriology has been thoroughly revised and brought up to date. Extensive changes have been made in the sections dealing with active immunization against diphtheria and scarlet fever and recent additions to our knowledge of yellow fever, poliomyelitis, bacteriophage, undulant fever, etc., have been incorporated in this edition. Certain chapters have been revised and brought up to date by workers who have specialized in particular subjects, with the result that the book contains all the latest information.

The comprehensive summary table which gives the essential characters of and pathological conditions caused by the commoner bacteria and which was one of the most useful features of this book has been thoroughly revised and brought up to date. This new edition will undoubtedly prove useful to the student of medicine and we have no hesitation in strongly recommending this book.

C. L. P.

LYMPHATICS, LYMPH AND TISSUE FLUID.—By C. K. Drinker, and M. E. Field. 1933. Published by Baillière, Tindall and Cox, London. Pp. xvi plus 254. Illustrated. Price, 17s. 6d.

IN this book the authors have attempted to summarize what is known of the physiology of the mammalian lymphatic system and also to incorporate some of their own views and experimental findings. There are altogether eight chapters in the book and certain important aspects of the subject, such as the permeability of blood capillaries, the composition of lymph and tissue fluid, the factors concerned in the flow of lymph and the mechanism of disposal of colloidal particles entering the lymphatics, are all dealt with in a magnificently lucid manner. The data presented in the book are of great interest to the physiologist, the pathologist and the immunologist and therefore a perusal of the book will be found highly beneficial by those interested in these subjects. An extensive bibliography of over 68 pages is given at the end and this indeed is a valuable addition.

K. V. K.

VOLUMETRIC ANALYSIS.—By H. P. Starck, M.A. (Cantab.). 1934. Baillière, Tindall and Cox, London. Pp. viii plus 228, with 11 figures. Price, 7s. 6d.

SEVERAL texts, both large and small, have appeared on the quantitative analysis of inorganic compounds both by gravimetric and volumetric methods, and there are also one or two large texts on volumetric analysis alone. The latter are really standard books of reference and are too bulky for an ordinary student. The present text is a handy little volume and the low price brings it within the reach of every student. It is divided into five sections. The first section is an introductory one, making some preliminary remarks and dealing with the theory and proper use of different indicators. The second section deals with acidimetry and alkalimetry, and the third section, which is a large one, is divided into two parts and deals with oxidation and reduction methods. The fourth section deals with precipitation methods, and the fifth discusses some of the applications of volumetric methods to the mixtures of two or more substances. In each example, the reaction is explained briefly with the help of equations,

and the calculations help to make it clear; this is followed by a short description of the procedure to be adopted. The descriptions sometimes appear too brief for a beginner, but an intelligent student cannot fail to grasp it soon. Many examples of the quantitative analysis of organic compounds are found along with the inorganic ones and many of the sections are provided with problems at the end for their solution. From the large variety of examples chosen the book will prove useful not only to the students for university scholarships, national certificates, pharmaceutical, medical and general examinations in chemistry as suggested by the author, but also as a handy and useful companion for post-graduate workers in various laboratories where such quantitative work for determining the purity of compounds is carried out.

S. G.

FORENSIC MEDICINE—CATECHISM SERIES.—By A. Allison, M.B., Ch.B., B.Sc., D.P.H., F.R.F.P.S. (Glas.). Third Edition. E. and S. Livingstone, Edinburgh. Pp. 80. Price, 1s. 6d. Postage 2d.

THE book is well written and ought to be very useful to those for whom it is primarily intended. Though the book is based on European observations, still it helps the students to revise the more important chapters of the subject. It is an excellent cram book and can be safely recommended to students going up for examination.

D. A.

BEHIND THE DOCTOR.—By L. Clendenen, M.D. 1933. William Heinemann (Medical Books) Ltd., London. Pp. xxi plus 458, with 147 illustrations. Price, 21s.

THERE has been a tendency in recent years to write history as a consecutive story of human advancement, rather than as a dull record of past incidents. An example of an attempt of this kind was Mr. H. G. Well's history of the world; Dr. Clendenen's book is such another. In order to fill in the gaps and present the history of medicine in readable form the author has had to draw pen pictures, based on recorded historical facts, on impressions of the customs of the time gained from the literature, and on the assumption that human nature has undergone little change during a period of six thousand years, but nevertheless entirely imaginative as regards actual details. The result is quite satisfactory, in a book written mainly for the layman or the medical man who has hitherto taken little interest in medical history, but the more advanced student of medical history will become a little impatient with the circumlocution entailed in such a method of treating the subject.

We can strongly recommend this book as a very readable introduction to medical history. It is also a book that the doctor can confidently recommend to his patients; from it they will acquire a better understanding and a deeper appreciation of medical science.

L. E. N.

- I. **THE CHEMISTRY AND PHYSICS OF CONTRACEPTIVES.**—By C. I. B. Vogt, B.Sc., Ph.D., F.R.S. (Edin.). Jonathan Cape, London. Pp. 288. Illustrated. Price, 12s. 6d. [Obtainable from Messrs. Butterworth and Co. (India), Ltd. (Publishers), Calcutta.] Price, Rs. 9-6
- II. **CLINICAL CONTRACEPTION.**—By G. M. Cox, M.B., B.S. 1933. William Heinemann (Medical Books) Ltd., London. Pp. ix plus 173. Illustrated. Price, 7s. 6d.
- III. **THE HYGIENE OF MARRIAGE.**—By I. E. Hutton, M.D. Fourth Edition. 1933. William Heinemann (Medical Books) Ltd., London. Pp. 146. Illustrated. Price, 5s.

ONE must assume that there is an almost limitless demand for books on sex hygiene, birth control, and

allied subjects, as we are assured in the prefaces of the books on these subjects, which arrive by almost every mail from Europe, that they are written at the urgent request of some society or to fill 'a long-felt want' of a certain class of reader. We are looking forward to the day when a writer claims, we will not say admits, that she (ninety-five per cent of the writers are women) is writing a book with the object of selling as many copies as possible and making a handsome profit. We do not pretend that medical literature is not richer than it was twenty years ago, by the addition of this type of book, as now at least the medical man does not have to go to the pornographical bookshop to gain the knowledge on sex matters that is necessary to him if he is to advise his patients properly. (The cynic will perhaps say that this is because the pornographical bookshop has invaded the medical library.) But we cannot help thinking that there is much unnecessary duplication, and we feel that it is our duty to select from the pile of books that are sent to us for review only those that, in our opinion, fulfil a special function and fulfil it well.

Each of the three books under review is written for a special class of reader. The first is a record of scientific investigation into the mode of action and the relative efficacy of various drugs and appliances used to prevent conception; it is written for the 'specialist' in birth control, whether he or she be a member of the medical profession or a social worker. For the sake of the latter group of reader many explanatory details, which would be unnecessary for medical readers or non-medical scientists, are given. The investigations reported were undertaken under the auspices of the National Committee of Maternal Health, New York, but the work was carried out in collaboration with Professor Crew of the Animal Breeding Research Department, University of Edinburgh. The book is a valuable contribution to the subject.

Dr. Gladys Cox's book is essentially a medical book, written for medical men and women. No space is given to discussions on the ethics of birth control, though there is a section on its medical indications. After an introductory chapter and a second on the physiology of conception, the author gets down to her subject, and describes and discusses different methods of contraception, as one would different forms of treatment in an ordinary medical book, giving a number of methods with their advantages and disadvantages, their special indications and contra-indications. There is a final chapter on birth control clinics and the position of birth control in the public health services.

Dr. Hutton's book is written for the direct instruction of the public. It is a book that the doctor can confidently recommend to his patients. The subject of the sex relationship of man and woman is discussed openly but entirely inoffensively. There are chapters dealing with birth control, but the subject is not overstressed. We have reviewed earlier editions of this book and we are glad to see that it has now reached its fourth; it is undoubtedly one of the best of its kind.

THE LAST OF THE TABOOS, MENTAL DISORDERS IN MODERN LIFE.—By I. E. Hutton, M.D. William Heinemann (Medical Books) Ltd., London. Pp. 204. Price, 6s.

'THIS book will be of absorbing interest to the general public as well as to social workers, and to those concerned, professionally and otherwise, with the care and treatment of the insane'. So say the publishers. If the word 'should' be substituted for 'will', and 'absorbing' be deleted, the sentence would gain both in modesty and truth. However, if the attitude is taken that the end justifies the means, and if the sentence as it stands increases the sales we will certainly not grudge them their little 'boost', for nobody will be the poorer for reading this book and in some unexpected places it may sow fertile seed.

The title and sub-title together give a clue to the trend of the book. The author claims that nowadays every subject is discussed freely (even the most intimate details of sex relationship, and in this field the author can certainly claim to have played her part in tearing away the veil of false modesty) with the single exception of mental disease. The average individual, especially the average woman, and the writer being a woman has probably suffered this type of confidence, is prepared to discuss in great detail her husband's bowels, or even a plithical cousin, but maintains a rigid silence about an uncle who is in a mental asylum. The writer's contention is that she should be willing to discuss the last-named as freely as the other subjects, and in fact talk of the mental homes she herself has been in, as openly as she would her visits to Bath or Harrogate. The subject of mental disease is not a very pleasant one, neither is that of bodily disease, and, if people are prepared to discuss the latter (and they are—*ad nauseam*), they should not so studiously avoid the former subject.

The medical profession is largely to blame because they pander to these unreasonable prejudices of their patients; they refer to a condition as a 'nervous breakdown' and call in a nerve specialist, when they should really diagnose 'manic-depressive insanity' and call in a mental specialist.

Finally, the Law of the Land is arraigned. Certification is far too complicated a process. Two doctors and a magistrate have to see the patient within a prescribed period; this is often difficult to arrange, it frightens the patient, and gives a wrong impression to the relatives. It should be as easy to send a patient to a mental asylum as it is to a fever hospital; it would then not be looked upon as a serious event, and the last of the taboos would be short-lived.

L. E. N.

AIDS TO BOTANY.—By H. J. Bonham. 1934. Baillière, Tindall and Cox, London. Pp. viii plus 221, with 47 figures. Price, 3s. 6d.

THIS small book on botany is written in such a simple language that it will be found very useful to the beginner. It contains the essentials of the subject presented in a concise manner. The inclusion of the common Natural Orders of the flowering plants enhances the value of the book. The simple notes on plant ecology and variation, heredity, Mendelism and evolution will be very interesting to a novice. Although the subject-matter does not completely cover the I.A., and I.Sc. course of the Indian universities, it will be a very useful companion to the textbook.

E. G.

THE CONJOINT FINALS.—By G. N. Beeston, M.R.C.S. (Eng.), L.R.C.P. (Lond.). Second Edition. 1933. John Bale, Sons and Danielsson, Ltd., London. Pp. vi plus 158. Price, 6s.

THE sub-title of this book, 'A reproduction of all the questions set in medicine, surgery and midwifery from 1911 to 1932 classified under the various systems and arranged in the date-order of their occurrence, together with a new section on pathology and bacteriology', is self explanatory. It will not only be found useful to students going to England to take the Conjoint Board examinations, but to teachers and examiners in this country, as a guide to their teaching and to provide suggestions for questions they are required to set in examinations in this country.

MEDICAL ENTOMOLOGY ON CHART.—By R. C. Acharyya, D.T.M. 1934. To be had at 12, Bipradas Street, Calcutta. Price, Rs. 2. Postage extra.

THIS is another example of literature perpetuating the terrible caste system of Linnæus. Within this

hidebound system, however, the author has compiled a very useful table, showing in only two sheets the important characters of his phyla and other castes.

While he should have got some entomologist friend to correct such mistakes as 'Solifugae or whip scorpions' and some pedagogue to object to the spelling Newzeland, for New Zealand, his main object, of enabling students who use it to pass their examinations, will doubtless be assured.

The amount of care put into the disposition of the group in the tables is most praiseworthy as also is the get-up of the publication.

OTHER BOOKS RECEIVED.

Dissecting Aneurysms. By T. Shennan. 1934. Special Report Series, No. 193. (Medical Research Council). Published by His Majesty's Stationery Office, London.

Abstracts from Reports

THE ANNUAL REPORT ON THE WORKING OF THE CIVIL HOSPITALS AND DISPENSARIES IN THE MADRAS PRESIDENCY FOR THE YEAR 1932. BY MAJOR-GENERAL C. A. SPRAWSON, C.I.E., V.H.S., I.M.S., SURGEON-GENERAL, WITH THE GOVERNMENT OF MADRAS

Number of hospitals and dispensaries.—The total number of medical institutions of all classes working in the Presidency at the beginning of the year under report was 1,337 (1,091 in rural areas and 246 in urban areas), 30 new dispensaries were opened, 20 were closed and 10 were transferred to other classes during the year.

Visited-dispensary system.—The 'visited-dispensary' system previously known as 'dispensary-doctor' system which allows a medical officer or practitioner to leave his permanent dispensary where there is not sufficient work to engage him fully, on two fixed days a week at specified hours in order to travel with his appliances to another village or villages close by and render medical aid there, has been working only in six districts and in the Vizagapatam Agency. This system can be considered satisfactory only in a few exceptional places or with exceptional individuals to work it. It is not proposed, therefore, to extend this method of medical relief as a whole but to employ it only when particular circumstances indicate that it may be used advantageously.

Nursing staff.—For the first time in the history of the nursing service in this Presidency, the number of qualified nurses who were available for appointment as staff nurses after the examinations held in June and December 1932 were in excess of the number of vacancies available for them.

Midwives.—At the instance of the Madras nurses and midwives council, a scheme of training and examination of candidates for the vernacular course in midwifery in Government hospitals was sanctioned by Government. The Madras nurses and midwives council have, during the year 1932, recognized four institutions as training centres for midwives for the scheme sanctioned. On 31st December, 1932, the council had on its registers 780 nurses, 1,668 midwives and 7 dais.

Antirabic treatment.—A higher dosage of 5 per cent carbolyzed vaccine for the treatment of both civil and military patients was introduced at the Government General Hospital, Madras, from 1st June, 1932. No new centres were opened during the year.

Leprosy.—In view of the successful working of the group leprosy scheme sanctioned for two years from 1st May, 1931, its continuance has been sanctioned for a further period of two years from 1st May, 1933. The year under report is characterized by increased activities and by the organization of an intensive anti-leprosy campaign by social workers in Salem district. Several medical officers especially those in charge of leprosy clinics were given training in the treatment of leprosy. About 120 leprosy clinics were opened during the year bringing the total number of such clinics throughout the Presidency to 196.

The awakening of so many in the Salem district to a sense of citizenship and co-operation and the popular enthusiasm that has led to the erection by private donors of leprosy clinics, operating theatres, maternity wards and other needed buildings have been the most striking features of the medical year throughout the Presidency.

With a view to affording greater facilities to Government servants for leprosy treatment, the Government have recognized fourteen additional medical institutions as treatment centres for leprosy during the year.

Many district and taluk boards have not yet realized the utility of the leprosy campaign with the result that several areas where clinics are very essential are yet untouched. It is hoped that the local bodies will soon realize the importance of the survey of leprosy and of propaganda and contribute towards the successful development of the work. An intensive campaign against leprosy can be revived under these heads—Treatment, propaganda, survey, school medical inspection and social service.

Veneral diseases.—The venereal department of the Government General Hospital, Madras, under Dr. R. V. Rajam, M.B., M.S., has worked satisfactorily. In the course of the year, 6,846 cases were examined and treated at the General Hospital. A little more than 90 per cent of the patients have been treated as out-patients. Venereal clinics have been opened in the following mofussil medical institutions:—Headquarters Hospitals at Coimbatore, Cuddapah, Masulipatam, Madura, Calicut, Nellore and Tanjore; Women's and Children's Hospitals at Calicut and Negapatam and Government Hospital, Rajahmundry. It is expected to open more clinics in the mofussil as funds become available for the purpose.

Honorary medical officers.—Revised rules regarding honorary medical officers have been issued by Government. Applications from candidates for honorary appointments with reference to the revised rules have been invited by advertisement and proposals have been sent up to Government for the appointment of suitable candidates as honorary medical officers.

THE REPORT ON THE WORKING OF HOSPITALS AND DISPENSARIES IN THE PUNJAB FOR THE YEAR 1932

THE Medical Department, perhaps more than any other, has felt the full effect of the unprecedented financial stringency which Government have had to face in recent years. Being a beneficent department, it has no financial resources of its own, but depends for its progress and expansion entirely upon Government grants. When these grants are restricted to the barest necessities, it is to be expected that the annual record of the department would not be one of continued advance, and therefore it is sufficiently gratifying that it is one of sustained activity.

The Royal Commission on Agriculture in India recommended that vital statistics for rural areas should include particulars of the strength and distribution of the medical and health services including trained

midwives. Acting on this recommendation, the Government of India directed, *inter alia*, that the provincial reports on hospitals and dispensaries should be amplified so as to give the number of medical institutions in urban and rural areas separately, and that a new table should be added to these reports showing the strength and distribution of the medical and health services, including trained midwives, in these areas. In accordance with these instructions, statement A, which appears in this report, has been amplified, for the first time, so as to give the details required by the Government of India, and a new table, which appears as an annexure to statement A, has been added showing the strength and distribution of the medical and public health services, including trained midwives, in rural and urban areas in each district in the province.

This new table is very instructive inasmuch as it shows the concentration of trained women—midwives and nurses—in urban areas. Of the 29 districts of the province, 18 cannot boast of a single trained woman worker in rural areas. Thus, although much has been done in extending qualified medical aid by women to women in rural areas in some of the districts, a great deal remains to be done in others; and it is to be hoped that more and more trained women workers will be available for ministering to the needs of women in rural areas as enlightenment spreads and weakens the force of 'custom', which, unfortunately, still hampers medical activity in this direction.

Of a total of 414 trained nurses and midwives employed in the province, only 43 work in the rural areas, and, of the latter, half the number are employed in the districts of Kangra and Karnal alone.

The beginning of the year 1932 saw 1,001 dispensaries of all classes in operation. Seven more were opened during the course of the year while 31 were closed, and one transferred from class IV to class I, leaving 974 working at the close of the year. The dispensary shown as transferred from class IV to class I is the Lady Aitchison Hospital, Lahore, which was provincialized during the year, and its classification thus changed from 'class IV private aided' to 'class I state public'. Canal dispensaries and the dispensaries maintained from local funds account for the largest number (26) of the closures; the other 8 dispensaries closed being: departmental institution 1, private aided 2, private non-aided 2 and railway 3. The newly opened dispensaries include 4 railway, 2 local and municipal fund and one private non-aided.

Subsidized dispensaries.—In the district of Attock two of the rural dispensaries were transferred to the charge of private practitioners and a new class thus established which may be designated 'subsidized dispensaries'. The general scheme of work of this class of dispensaries is as follows:

A private practitioner is placed in charge of a dispensary and is given Rs. 25 per mensem by way of a subsidy. The practitioner thus placed in charge of the dispensary is not liable to be transferred to another dispensary without his consent but in other respects is subject to the same conditions of service as the whole-time medical officers in charge of rural dispensaries. A whole-time dispenser who is an employee of the district board is appointed to the dispensary on a salary of Rs. 25 per mensem and a grant of Rs. 500 per annum is given for drugs and instruments. The total cost of such a dispensary is thus Rs. 1,100 against Rs. 2,500 that of a rural dispensary under the existing scheme. The practitioner has to make his own arrangements for menial servants and for any miscellaneous expenditure connected with the dispensary. He is also entitled to charge for medicines supplied to patients, except to the very poor, in accordance with a scale which lays down the maximum chargeable in this manner.

The scheme is being tried as an experiment, and it remains to be seen whether it is going to be a success or not. Should it prove successful, it is obvious

that it will make it possible to expand medical relief all over the province to a much greater extent than has been possible hitherto.

Provincialization.—For reasons of economy, the scheme of provincialization of hospitals and dispensaries also has come to a standstill, and no new hospitals or dispensaries, maintained by local bodies, were provincialized during the year under report. As stated in the report for 1931 there are 67 hospitals and dispensaries which remain to be provincialized and taken over by Government, and this will be done as soon as financial considerations permit.

Medical aid for women.—Remarkable improvement in this respect took place in the Attock district in the year under report. The Anant Ram Zenana Hospital at Tallagang in the Attock district was opened during the year under report and the women's section of the civil hospital, Campbellpur, was placed in charge of a woman sub-assistant surgeon. A travelling woman sub-assistant surgeon was also appointed in the same district, with headquarters at Jand. On the other hand, there was a set-back in some of the places in the same district. The women's hospitals at Bhera, district Shahpur, and Narowal, district Sialkot, which were maintained by Mission authorities were closed during the year. Sirsa, Panipat, Chiniot and Shorkot remained without women sub-assistant surgeons as the local bodies concerned were unable to secure the services of lady doctors on the scales of pay sanctioned by them. The most noteworthy feature of the year, however, is that the Lady Aitchison Hospital, Lahore, was provincialized.

There are at present only 42 (or 44 including two private non-aided hospitals at Bhiwani and Ambala Cantonment) separate hospitals for women in the Punjab in charge of women doctors and 21 more lady doctors are attached to the women's sections in the general hospitals.

Women sub-assistant surgeons attached to the provincialized taluk hospitals and dispensaries are also now required to examine medically school girls in their vicinity. The main object of the scheme is to popularize medical relief among women and it has, therefore, been impressed upon the women doctors that they should make every effort to get into touch with the school mistresses and mothers of the girls in order to inspire confidence in them. Further, they have been instructed to make a point of giving health talks to women on matters of personal hygiene and on causation, prevention and treatment, etc., of minor ailments. It is hoped in this manner to make the hospitals even more popular than at present.

Medical education for women.—The Punjab Medical School for Women which is incorporated with the Women's Christian Medical College for Women, Ludhiana, was hitherto the only institution on which the province depended for its supply of lady doctors required for the charge of hospitals and dispensaries for women. But to meet the growing demand among women for medical education of the degree standard, the system of co-education was introduced in the King Edward Medical College, Lahore, in the year 1929 and extended to the Medical School, Amritsar, during the year under report. These institutions which are primarily intended for men students now also train women for the M.B., B.S. degree of the Punjab University and the 'L.S.M.F.' diploma of the Punjab State Medical Faculty. Up to 10 seats are reserved annually for the admission of women students to the King Edward Medical College, Lahore, and the number of women students to be admitted to the Medical School, Amritsar, has now been raised from 10 to 15. There were 20 and 13 women students on the rolls of these institutions respectively at the end of the year 1932. The system of co-education in these two medical institutions appears to be working satisfactorily.

As women's education in the province is advancing very rapidly, the number of girls seeking admission to medical colleges and schools is fast increasing.

The accommodation in the existing institution is very limited, and more and more candidates find it difficult to secure admission every year. The necessity for the separate medical school for women which the Government contemplated to establish at Lahore is thus obvious, and it is to be hoped that ways and means of bringing it into existence will soon be forthcoming.

Training of nurses and midwives.—In order to meet the demand from the Indian public for the provision of facilities for the training of Indian girls as nurses, a scheme was sanctioned during the year under report to permit of Indian women joining the hospitals as probationers, staff nurses and nursing sisters. Indian nurses are required to adopt the same style of living as the European and Anglo-Indian nurses attached to the hospitals but are permitted to wear *saris* if they should desire to do so. The scheme has been only recently introduced and its progress will be watched with interest.

An Act to provide for the registration and better training of nurses, health visitors, midwives and dais in the Punjab was passed during the year under report, and came into force in the province with effect from the 3rd September, 1932. Steps are being taken to establish the nurses' registration council provided for in the Act.

There is no regular examining body for the examination of nurses at present. All the training hospitals conduct their own examinations and give diplomas. It will be for the new nurses' council to determine if any departure from this should be made. It seems desirable that a central examining body like the Punjab State Medical Faculty should take over this important duty.

The Punjab Central Midwives' Board continued to discharge the important function of supervising the training and conducting the examinations of midwives of all grades. Several changes in the rules have been under consideration with a view to providing large facilities all over the province.

SUPPLEMENT TO THE ANNUAL PUBLIC HEALTH REPORT OF THE PROVINCE OF ASSAM FOR THE YEAR 1932

Abstract of a report on the yaws campaign in Kamrup district

THE credit of identifying the disease in this district belongs to Dr. N. C. Dey, Sub-Assistant Surgeon, of the then Khetri kala-azar dispensary in 1929. He started the treatment on a small scale with drugs purchased by the patients themselves. A full account was published by Dr. Dey in the *Indian Medical Gazette*, August 1930, but treatment was suspended early in 1930 partly because the patients were unable to pay for continued treatment and partly because the value of prolonged treatment was not realized at the time.

In January 1931 Captain FitzGerald, who had become interested in the work commenced by Dr. Dey, and had been impressed by the large number of cases shown to him by the latter, decided on more thorough investigation and more systematic methods of treatment and observation, using a supply of drugs which were kindly provided by their various makers for trial. In April 1931 the first grant (Rs. 1,000) was made available by Government for the purchase of drugs.

DISTRIBUTION

The disease is confined in the western part of the district mainly in areas between the South Assam Trunk Road and the Khasi Hills, in the eastern part it is to be found in villages situated at the foot of the hills on either side of the trunk road up to and beyond the Nowgong border. To what extent it prevails in Nowgong district can be gauged only roughly from the number of cases that attend the most eastern centre at Verakuchi. From the north of Digaru (Assam-Bengal Railway) cases come from the Mayang

group of villages (Nowgong district) and from the areas in the vicinity of the Panbari and Panikhati railway stations close to Gauhati.

In the endemic areas to the east of Gauhati the disease is chiefly confined to the Mikirs, Jalungs, Garos, Kacharis and Rabhas, to the west to the Garos, Khasis, Kacharis and Rabhas, although the disease has been seen amongst the Koch caste in the eastern part of the district. Lately one better class Hindu, a Mohammedan and a Nepali living in villages in close contact with these cases have been found with the disease.

A questionnaire addressed by the civil surgeon to sub-assistant surgeons in charge of dispensaries in this district did not reveal a single case having been treated in 1930. Nor is it a matter of surprise that the people do not present themselves for treatment for, unless the condition is recognized and arsenicals given, this is found to be useless.

There is no doubt that yaws exists to a hitherto unsuspected extent in the Assam Valley and probably in the Surma Valley as well. One is inclined to think that many of the venereal cases treated in the campaign amongst the hill tribes might have in reality been undiagnosed yaws.

Economically this condition is of great importance as the period of maximum disability coincides with that of planting and tending the crops. Indeed all yaws lesions become worse in the damp heat and there is a tendency for them to improve during the colder months.

ORGANIZATION

Treatment is afforded by the two public health dispensaries, *viz.* Digaru and Hahim, which are situated in the yaws endemic areas. The dispensary at Digaru with its sub-centres really serves a stretch of land about 35 miles long. At each of these centres kala-azar and leprosy are also being treated. The yaws campaign began in a very small way and has steadily progressed.

The assistant surgeon, public-health department, Nowgong, was trained in the technique of diagnosis and treatment at the Digaru dispensary and its sub-centres in December 1932 and a centre at Morigaon was opened in Nowgong district.

The assistant surgeon, public-health department, Goalpara, was also trained at Digaru and its sub-centres in June 1933 and a treatment centre at Agiya is being opened shortly.

TREATMENT

It has been found by experience that yaws is characterized by the extreme chronicity of the condition and requires prolonged treatment in all but its earliest stages; this is contrary to the general impression given in textbooks that yaws is readily cured by one or two injections of N. A. B.

Of 263 cases treated by Dr. Dey in 1929-30, 141 cases were traced subsequently.

These cases had been treated with injections of 0.3 or 0.45 grammes of N. A. B. and the number of injections received by each case is shown below:—

	Total	Clinical relapse	SERUM	
			Positive	Negative
One injection	101	47	34	20
Two injections	29	12	11	6
Three injections	7	3	2	2
Four injections	2	1	1	0
Six injections	2	2	0	0
	141	65	48	28

Of these 65 showed clinical relapse prior to 1931 and sera of the remaining 76 cases were examined at the

Pasteur Institute showing 48 positive and 28 negative. Thus of the whole series 20 per cent only could be regarded as permanently cured (and the cure rate was the same whether they received one or more than one injection.—*Editor, I. M. G.*)

Various synthetic arsenicals and preparations of bismuth were used either alone or in combination.

Sera of cases are sent to the Pasteur Institute, Shillong, for examination after absence of a clinical relapse for periods of six months to a year. Batches of sera are also examined by the Sachs-Georgi method at the Sadr hospital, Gauhati.

Correspondence

A CASE OF HYDROPHOBIA AFTER PREVENTIVE INOCULATION

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR,—In your February 1934 issue, page 81, you have published a case of 'Hydrophobia after Preventive Inoculation' with your note of comment.

I hasten to give you a case which will interest you, I am sure.

My youngest brother aged three years was bitten by a rabid dog, unprovoked, in 1909; I forget the exact month. I managed to kill the dog and sent it to the veterinary surgeon, Trichinopoly! I took the child immediately to the Pasteur Institute, Coonoor, as the wounds were all on the face. The boy underwent fourteen days' injection treatment and I reported his good health six months later. However, after a year he suddenly developed signs of hydrophobia and died. I can assure you that he was not bitten a second time by any dog after he got 'cured' by the injection treatment.

These were incidents before I entered the medical course, but I vividly remember to-day the whole thing. Certainly there ought to be some difference between 1909 treatment and 1933 treatment. Or are we on the same ground as 1909?

Yours, etc.,

S. RAMADAS, L.C.P. & S. (Bom.),
L.M.S. (Lond.), L.R.C.P. (Lond.), M.R.C.S. (Eng.),
Assistant Surgeon.

MUNICIPAL HOSPITAL,
NANDYAL,
28th February, 1934.

[Note.—We sent a copy of this letter, with further details supplied by our correspondent, to the Director, Pasteur Institute of Southern India, Coonoor, who confirmed the fact that this boy underwent a full course of treatment from the 6th March, 1909, to 19th March, 1909, and added the following comment: 'The period of observation of treated patients was then only three months, and he was certified by the District Medical and Sanitary Officer, Trichinopoly, on the 19th June, 1909, to be alive and well.'

The fact of the death of the patient was not communicated to this office.—*Editor, I. M. G.*

Service Notes

APPOINTMENTS AND TRANSFERS

MAJOR-GENERAL SIR ROBERT MCCARRISON, Kt., C.I.E., K.H.F., an officer of the Medical Research Department, was placed on foreign service under the Indian Research Fund Association, from the 14th May, 1933, to 20th May, 1933, and from 8th August, 1933, to 13th August, 1933, while he was on deputation in connection with the Second International Goitre Conference held at Berne in August 1933.

The services of Lieutenant-Colonel C. M. Plumptre, Officiating Superintendent, St. George's Hospital,

Bombay, are placed at the disposal of the Government of Madras, for employment as Professor of Midwifery, Medical College, and Superintendent, Government Hospital for Women and Children, Madras, with effect from the date on which he assumes charge of his duties.

Major S. Nag, Civil Surgeon, Murshidabad, is appointed as Civil Surgeon, Jalpaiguri.

Major P. C. Banerji, Civil Surgeon, Bakarganj, is appointed as Civil Surgeon, Chittagong.

Major B. G. Mallya, Civil Surgeon, Chittagong, is appointed as Civil Surgeon, Howrah.

Major W. M. Will, Officer-in-Charge, Medical Store Depot, Bombay, is appointed to officiate as Assistant Director-General, Indian Medical Service (Stores), during the absence of Lieutenant-Colonel Sweet, D.S.O., on leave.

The services of Major L. S. Mody are placed at the disposal of the Government of the Central Provinces for employment in the Jail Department, with effect from the 10th February, 1934.

Major S. R. Prall is appointed to officiate as Superintendent, St. George's Hospital, Bombay, with effect from the afternoon of the 2nd March, 1934, pending further orders.

The unexpired portion of the leave granted to him is hereby cancelled.

Captain J. C. Drummond is appointed, until further orders, as Civil Surgeon, Hooghly.

The services of Captain Hoe Min Sein are placed temporarily at the disposal of the Government of Burma, with effect from the 26th February, 1934.

The services of Captain J. E. Gray are placed temporarily at the disposal of the Government of Bombay, with effect from the afternoon of the 31st January, 1934.

Captain S. M. K. Mallick, an officer of the Medical Research Department, is appointed as a Supernumerary Officer at the Central Research Institute, Kasauli, with effect from the date on which he assumes charge of his duties.

The services of Captain J. F. Shepherd are placed temporarily at the disposal of the Government of Madras, with effect from the 13th February, 1934.

The services of Captain M. H. Shah are placed at the disposal of the Government of the Punjab, for appointment as Officiating Medical Superintendent, Punjab Mental Hospital, Lahore, with effect from the afternoon of the 31st January, 1934.

Captain H. S. Waters is appointed to hold charge of the duties of the post of Presidency Surgeon, Bombay, in addition to his own duties, *vice* Lieutenant-Colonel A. N. Thomas, D.S.O., proceeding on leave, with effect from the afternoon of 5th April, 1934, or subsequent date of relief.

Captain R. Linton, Civil Surgeon, Midnapore, is appointed as Civil Surgeon, Mymensingh.

To be Captains (on probn.)

R. K. Misra. Dated 11th January, 1933, with seniority 2nd April, 1925.

A. N. Duggal. Dated 21st May, 1933, with seniority 19th May, 1930.

A. A. Pullar. Dated 12th February, 1934, with seniority 12th January, 1934.

To be Lieutenants (on probn.)

5th February, 1934.

R. L. H. Minchin, with seniority 5th February, 1932.

W. G. Kingston, with seniority 28th April, 1932.

Richard de Soldenhoff, with seniority 5th February, 1933.

R. R. Prosser.

J. Scott.

J. Edis-Myers.

T. K. White.

D. W. Taylor (Seconded).

C. J. Hassett.

S. G. O'Neill.

F. J. Doherty.

J. W. D. Goodall (Seconded).

Lieutenant B. F. B. Russell is restored to the establishment, 5th February, 1934.

To be Lieutenants (on probn.)

C. B. Miller, 13th February, 1934 (Seconded).
E. Parry, M.B., 15th February, 1934.
W. G. Kennedy, M.B., 19th February, 1934.

LEAVE

Lieutenant-Colonel A. N. Thomas, D.S.O., Presidency Surgeon, Bombay, is granted leave in India for a period of 1 month and 6 days, with effect from the afternoon of the 5th April, 1934, or subsequent date of relief.

Lieutenant-Colonel R. Sweet, D.S.O., Assistant Director-General, Indian Medical Service (Stores), is granted combined leave for 12 months, with effect from the 30th March, 1934, or subsequent date from which he may avail himself of it.

PROMOTIONS

Colonel Sir R. McCarrison, Kt., C.I.E., K.H.F., to be Major-General, 19th July, 1933.

Colonel D. P. Goll to be Major-General, 16th November, 1933.

Lieutenant-Colonels to be Colonels

H. C. Buckley. Dated 24th October, 1933, with seniority 1st August, 1928.

C. H. Reinhold, M.C. Dated 16th November, 1933, with seniority 1st March, 1929.

Majors to be Lieutenant-Colonels

Dated 1st February, 1934.

N. S. Jatar, D.S.O.

M. L. Treston.

A. Chand.

R. Lee.

T. S. Shastri.

C. deC. Martin.

J. H. Smith.

Dated 6th February, 1934.

J. B. de W. Molony, O.B.E.

K. R. Batra.

B. H. Singh, M.C.

O. R. Unger.

A. H. Hart. Dated 7th February, 1934.

N. Briggs. Dated 10th February, 1934.

F. R. Thornton, M.C. Dated 11th February, 1934.

R. L. Vance. Dated 15th February, 1934.

F. Griffith. Dated 8th March, 1934.

J. P. Huban, O.B.E. Dated 23rd March, 1934.

Lieutenants to be Captains

F. A. B. Sheppard. Dated 2nd February, 1934.

M. K. Bryce. Dated 3rd February, 1934.

J. L. O'Neill. Dated 3rd February, 1934.

Lieutenants to be Captains (provl.)

E. H. Lossing. Dated 4th August, 1933.

M. Sendak. Dated 2nd February, 1934.

R. J. Jarvie. Dated 2nd February, 1934.

Lieutenant (on probn.) to be Captain (on probn.)

H. H. Mahmood. Dated 10th February, 1934.

Lieutenants to be Captains (Temp. Comms.)

Dated 9th March, 1934.

T. R. Pahwa.

M. A. Gaffar.

J. N. Vasudeva. Dated 26th March, 1934.

RETIREMENTS

Major-General W. V. Coppinger, C.I.E., D.S.O., 16th November, 1933.

Major-General J. D. Graham, C.B., C.I.E., K.H.S., retires 28th February, 1934.

Colonel L. Cook, C.I.E., 24th October, 1933.

Lieutenant-Colonel S. J. Bhatena. Dated 24th January, 1934.

RELINQUISHMENTS

The following relinquishments are permitted, subject to His Majesty's approval:—

INDIAN MEDICAL SERVICE. (Temp. Comms.)

Captain B. Singh. Dated 29th October, 1933.

Captain J. M. Gole. Dated 18th December, 1933.

RESIGNATIONS

The Governor-General is pleased to accept the resignation by the Honourable Major-General C. A. Sprawson, C.I.E., K.H.F., of his office of Member of the Council of State.

Notes

WATSON'S MICROSCOPIC RECORD

Watson's *Microscopic Record* is far from being an ordinary disguised trade circular. In each number will be found useful, disinterested hints to microscopists, as well as a description of the latest productions of this firm which cannot fail to interest both medical and non-medical users of the microscope.

The recently-issued number contains, amongst other interesting articles, a description of the mica-sheet method of making microscopic preparations. This method will appeal more particularly to the lecturer or demonstrator as it provides him with an easy way of preparing and staining uniformly a large number of sections for distribution to his students. The method consists in fixing sections, or other specimens, on mica sheets, which are then stained and counter-stained, dehydrated and cleared in the ordinary way. The mica sheet can be stored or used immediately, as circumstances dictate; in the latter case, it is cut up with a fine pair of scissors and the sections

distributed to the class for mounting on ordinary microscopic slides.

The number contains other interesting notes, for example on dark-ground illumination and on 'polarizers'.

DESCRIPTION OF PNEUMATIC TOURNIQUET

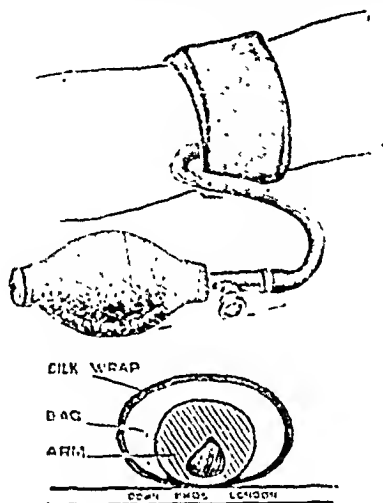
By H. C. SINDERSON, M.D., F.R.C.P.

DR. H. C. SINNERSON, Professor of Medicine, Royal College of Medicine, Baghdad, has devised a small pneumatic tourniquet for use in intravenous injections. The tourniquet consists of a rubber inflation bag under 5 inches long and less than 2 inches wide. One inch from one end is attached a piece of rubber tubing to which a small inflating ball with control valve is connected. The inflation bag, which lies flat when deflated, is contained in a washable cloth armlet, 36 inches in length and tapering to half an inch at the tail end. The bag is placed very loosely over the

front of the upper arm just above the bend of the elbow (as in sketch) with the inflation ball lying laterally in a pillow on which the elbow rests. The arm band is wrapped over the bag as with a bandage, the last two or three inches being tucked into the final fold.

The screw of the control valve is closed and the bag inflated. The needle is introduced into the vein and the valve then opened. Deflation is almost immediate and the injection is made with the appliance still in position, where it remains until the operation is completed.

The appliance is extremely small and simple to use; injection can be made without any adjustment of the bag after application and a further advantage claimed



is that, as the rubber bag is limited in position to the front of the arm, no movement of the limb is associated with deflation.

The tourniquet has been made by Messrs. Down Bros. and can be obtained complete, in leather case, for fifteen shillings and six pence.

LIVER EXTRACT B.D.H. (FOR INJECTION)

FOLLOWING the work of Minot and Murphy on the administration of liver in the treatment of pernicious anaemia and the work of Cohn and his associates on the development of methods of preparing liver extracts containing the hæmatopoietic principles, much research has been carried out in investigating the chemical nature of the anti-anaemic factor or, as it is called, the *pernicious anaemia fraction* of liver. Early attempts at preparing this fraction in such a state of purity as to warrant its injection as a routine method of liver medication resulted in the issue of products which produced serious depressor effects, while the therapeutic action showed little or no advantage over that produced by the oral administration of liver extract prepared by the method of Cohn.

As a result of a series of investigations in the B.D.H. laboratories a method has been worked out for preparing the anti-anaemic factor of liver, free from protein and in a highly purified form. This is now presented in a sterile isotonic solution suitable for general medicinal use by subcutaneous, intramuscular or intravenous injection.

One cubic centimetre of this solution, the amount recommended for one injection, is equivalent in anti-anaemic potency to 50 grammes of fresh liver, whilst its depressor effect does not exceed that of a 0.0005 per cent solution of histamine acid phosphate when introduced by the intravenous route into an etherized cat.

The issue of Liver Extract B.D.H. (for injection) meets the need for a concentrated liver preparation which can be relied upon for unfailing therapeutic action without any deleterious after-effects, either local

or general; furthermore, the product is entirely British.

It is not suggested that the treatment of pernicious anaemia by the injection of liver extract should replace the more general method of oral administration; on the contrary, the oral administration of liver extract will continue to be the routine method in the vast majority of cases of pernicious anaemia, and no patient who is making satisfactory progress through this method will need to be treated by injection. There are patients, however, to whom a pure, highly-active liver extract for use by injection will come as a boon; for example, there are those patients who are severely ill and cannot take medicine in any form by the mouth, also those patients who, on account of gastric disability, cannot tolerate powdered liver extracts when administered orally. Furthermore, there may be occasions, particularly among hospital cases, when it is exceedingly important to obtain a maximum reticulocyte response in the minimum time in order that the patient may be released from hospital as soon as possible, subsequent treatment at home taking the form of the oral administration of a daily maintenance dose of liver extract; in these cases a series of injections of a highly potent preparation will produce the effect of a comparatively long course of oral treatment, the advantage of injection over oral treatment being that the former is far more rapid in its effect than the latter.

DOSAGE

Liver Extract B.D.H. (for injection) has been tested clinically, and highly satisfactory results have been reported. In the majority of cases it is found that one intramuscular injection daily produces a quick response, and even in such cases as are in *extremis* the improvement is rapid; indeed, after one injection of 1 to 2 c.cm. daily for three or four days in most cases the patient can leave hospital and thereafter be able to adopt the oral method and to take the necessary daily maintenance dose without difficulty.

It is used in the form of a sterile isotonic solution in the form of ampoules of 1 c.cm. each containing the anti-anaemic principles of 50 grammes of fresh liver.

REMOLYSIN

REMOLYSIN. it is claimed, by supplying the glandular deficiencies, not only brings about a reduction of fat in a woman, but also tends to have a tonic effect on the entire body.

Remolysin supplies the glandular substances in a desiccated tablet form and may be taken over a considerable period without undesirable by-effects. Its purity and physiologic activity is warranted by a concern which for many years has specialized in hormonal preparations of exceptional merit.

In prescribing Remolysin, it is well to order small doses at the start (see directions), regulating the increase according to the tolerance of the patient and the amount of weight lost. The decrease should be gradual and not exceed fifty pounds from a person of two hundred pounds.

Further information may be had by writing to the Remogland Chemical Co., 25, West Broadway, New York City, or to the local distributors, namely Smith, Stanistreet and Co., Calcutta, and Kemp and Co., Bombay.

EUROPE'S MOST MODERN HOTEL

THE following news item has been received from London. It seems possible that medical visitors from India, who are strangers to London, may like to know of some reasonably-priced accommodation to which they can go immediately they arrive:

Visitors to London will now be able to stay at the most modern hotel in Europe.

In their bedrooms there they may choose their own climate. The moving of a small valve lever will regulate the temperature of each room to the climate of the land from which its occupant comes. Americans and some visitors from the Continent like to sleep in an atmosphere as hot as 70 degrees. The average Englishman, however, prefers one of 55 degrees or even cooler.

This hotel is at the Marble Arch, with a view over Hyde Park that is among the finest in London. Its name is the Cumberland, and it was opened on the 12th December, 1933.

There are 1,000 bedrooms, each with its own bathroom, toilet, and lobby. Yet the charges are modest.

A single bedroom with private bathroom and table d'hôte breakfast will cost 11s. 6d., and a double bedroom with private bathroom and two breakfasts will cost 19s. 6d.

VITAMINS A, B AND D

THE significance of the vitamins as vital hæmatopoietic factors in certain types of anæmias was not fully appreciated until recent work in hæmatology led to the elucidation of the factors essential to hæmatopoiesis. The work of *et al.* is based on experimental work and is now advanced that sprue,

coeliac disease, and tropical megalocytic anæmia are in some way connected with vitamin B, probably B₁₂, deficiency. This suggestion receives support from the fact that it has been demonstrated that anæmia, in association with coeliac disease and tropical megalocytic anæmia, is responsive to yeast preparations and that these diseases can be cured by a well-balanced diet. As far as is known at present, however, these special types of megalocytic and the microcytic nutritional anæmias only will respond to this treatment, as it has been shown that Addisonian pernicious anæmia, although a deficiency disease, as a result of the deficiency of the specific anti-anæmic factor found in the liver, will not respond to yeast preparations.

This introduces a useful concept as to the possible mode of action of the vitamins and suggests that in some instances deficiency diseases may be due to lack of effective interaction between some substances in the gastro-intestinal tract and the essential vitamin, rather than to a defective diet.

It is noteworthy that recent work indicates that the lymphadenoid type of goitre is related to deficiency of vitamins A, B and C in the diet, and that the absence of fresh fruits and vegetables and the substitution of margarine for butter are the chief faults in the diets of goitrous children in certain districts.

It is more than probable that under present conditions of life a large proportion of the population lives on a diet which predisposes to a chronic state of hypovitaminosis. This is particularly the case with those who are near the lowest economic level at which satisfactory growth and health can be maintained. This universal shortage may account for numerous conditions of indefinite chronic ill-health, and intestinal derangements with accompanying toxæmias. But knowledge of nutrition and dietary requirements is far enough advanced to enable a well-balanced diet to be designed.

Ever since the introduction of modern methods of production, necessitating revolutionary changes in the dietary, the value of cod-liver oil as one of the richest sources of the dietary principles, vitamins A and D, has long been fully recognized. Malt Extract, which contains the B vitamins, has also been accepted as an extra dietary source of great value. Thus the difficulties of thoroughly re-building the diet and safeguarding the vitamin content are no longer a matter of concern, and the problem of adding a supply of the B vitamins to the diet, in addition to vitamins A and D, is simplified by prescribing 'Kepler' Cod Liver Oil with Malt Extract.

SPIRONINE

(SYN. ELIXIR ANTI-ASTHMATICUM)

SPIRONINE is a stable elixir each fluid drachm of which contains 3 grains of di-iodo-caffeine hydriodide together with the soluble constituents of 7½ grains of coffee.

In the compounding of the elixir a medium has been selected which appears to possess remarkable power to enhance the therapeutic value of the iodo-caffeine by increasing its rate of absorption into the system.

The elixir is readily tolerated and is perfectly harmless.

The value of iodine, in suitable organic combination, in asthmatic conditions (and in bronchial affections generally) is a matter of common knowledge.

On the other hand, caffeine is known to exert a specific action on muscle tissue, whether it be striped, plain, or cardiac muscle. This alkaloid possesses also well-known properties as a diuretic and, in addition, it serves as an agent for the stimulation of the respiratory centre.

The combination of these two valuable drugs as exhibited in Spironine produces a remarkably beneficial effect in dyspnoic conditions, and for this purpose it finds a wide sphere of usefulness in general practice in those conditions in which an anti-spasmodic is indicated.

IN ASTHMA

The principal use for Spironine in general practice is for the relief of asthma during the intermittent paroxysms that usually accompany the feeling of impending suffocation. It is well known that these distressing disturbances are likely to lead ultimately to the development of permanent damage to the lungs and heart; the administration of Spironine immediately the respiratory spasms appear modifies the chances of subsequent cardiac damage.

It is not claimed for Spironine that it is in any sense a cure for asthma, but it is claimed that the distressing respiratory and cardiac symptoms to which asthmatic subjects are prone respond promptly to treatment with this product. It is recommended for administration at the onset of an attack; its effect is immediate, the paroxysmal expiratory dyspnoea being relieved instantly, and such after-effects as emphysema are prevented.

AS A CARDIAC STIMULANT

In addition to its use in the treatment of asthma and its complications Spironine is of value in general practice as a cardiac stimulant, and it has been prescribed with considerable success in cases of weak heart following influenza, diphtheria and other serious illnesses.

In chronic conditions Spironine is best administered before meals two or three times a day, but it may be administered at any time during an acute attack of asthma spasms. The dose is one fluid drachm; this may be taken in a little water, or in milk if preferred.

It is issued in bottles of approximately 2½ and 5 fluid ounces, respectively, and in larger bottles for dispensary purposes.

'TANNAFAX' TANNIC ACID JELLY

THE inconvenience of preparing fresh solutions of tannic acid, and the deterioration of the solution when stored have limited its employment as a first-aid treatment for burns.

The precipitation of protein by tannic acid and subsequent formation of a firm coagulum are prevented by the application of olive oil and grease, the removal of which is necessary before solutions of tannic acid can be effective.

This unnecessary and harmful delay may be avoided by the use of 'Tannafax' tannic acid jelly. The product is prepared by Burroughs Wellcome & Co. It

is non-oily and non-greasy and has a water-soluble antiseptic base that can be easily bathed off when medical treatment demands the removal of dead tissues.

'Tannafax' tannic acid jelly is issued in tubes of two sizes and should prove of value both as a first-aid application and in general routine treatment.

THE BLOODLESS PHLEBOTOMIST

We have just received an advance copy of the most recent number of *The Bloodless Phlebotomist*. This little journal published by the Denver Chemical Manufacturing Company of New York contains interesting articles written by physicians from many different countries, and while the purpose of the publication is to acquaint its medical readers with Anti-phlogistine, physicians will find a number of items and illustrations which will excite their curiosity and interest—altogether, the little journal is well worth reading and we note that 1,260,000 copies are printed in nine languages and distributed to every doctor in the world with a known address, excepting in the countries of Russia, Lithuania, and Bulgaria.

If you do not receive a copy write to the Denver Chemical Manufacturing Company, New York, who will place your name on their list. The journal will be supplied you free of all charges.

MESSRS. COW AND GATE'S MEDICAL BULLETIN

The attention of the medical profession is drawn to this interesting monthly publication issued by the Cow and Gate Medical and Research Laboratories. It contains useful summaries of and selections from recent reports and pronouncements on infant feeding questions and dietetic research; bacteriological investigations of milk supplies and milk production in general are subjects also reported on and discussed at some length.

The *Bulletin* is a very convenient and well arranged summary for the doctor who is interested in these questions but has not sufficient time to collect or extract his own material. Copies of the *Bulletin* will willingly be provided on application to Cow and Gate, Ltd., Medical and Research Department, Guildford.

LACTOGEN

LACTOGEN represents a full-cream dried milk, modified by the addition of pure carbohydrate in order to rectify the deficiency natural to cows' milk. Behind the product stands the world-wide reputation of the Nestlé Company as manufacturers of milk products for more than fifty years.

The factories are supplied with milk from cows grazing in some of the world's richest pastures, a factor having an important bearing on the vitamin content of the milk. The supplies received by the Nestlé factories may therefore be regarded as ideal in this respect.

As fresh milk varies considerably in composition—even from day to day—each batch allocated for the preparation of Lactogen is rapidly analysed. Cows' milk always contains much less carbohydrate than human milk, and this deficiency is corrected by the necessary addition. Similarly, the butter-fat is adjusted to a definite ratio so that the composition, after drying, may be strictly uniform.

The milk is then pasteurized at 145°, after which it is passed through the various processes which are especially designed to produce a dried milk containing the full nutritive elements and the vitamins that were present in the original fluid milk.

Although modern research has demonstrated that earlier fears concerning the destruction of vitamins in

dried milk were largely unfounded, the greatest care is taken in the preparation of Lactogen to preclude any such possibility; the actual process of drying, in fact, occupying but a few seconds. However, to guard against any possible deficiency of the antiscorbutic factor, it is advised that a suitable fruit juice be given daily. This provides a safeguard which is to be recommended even when breast feeding is followed.

Recommendations for infant feeding are printed on the tins and this feeding table has received the approval of eminent infants' specialists. This is only intended, however, as an indication of the nutritive needs of the average child. It may require to be varied according to body-weight, calorific requirements, etc., but from the composition data provided it is a simple matter to modify the feeds according to the needs of any particular case.

INSULIN PRICES REDUCED

Burroughs Wellcome and Co. have announced a reduction in prices of 'Wellcome' brand insulin, which are now as follows:—

'Wellcome' brand insulin, 20 units per c.c.m., 5 c.c.m. phials, Re. 1-7 each net; 20 units per c.c.m., 10 c.c.m. phials, Rs. 2-14 each net; 40 units per c.c.m., 5 c.c.m. phials, Rs. 2-14 each net. The price of 'Tabloid' hypodermic insulin hydrochloride (10 units) has also been reduced. Cartons containing 10 products in one tube are quoted at Re. 1-7 per tube net. These are Bombay net prices to the medical profession.

Publishers' Notice

SCIENTIFIC Articles and Notes of interest to the profession in India are solicited. Contributors of Original Articles are entitled to receive 25 reprints *gratis*; additional reprints can be obtained on payment. No reprints will be supplied unless contributors ask for them at the time of submitting their manuscripts.

Communications on Editorial Matters, Articles, Letters and Books for Review should be addressed to THE EDITOR, *The Indian Medical Gazette*, c/o The Calcutta School of Tropical Medicine, Central Avenue, Calcutta.

Communications for the Publishers relating to Subscriptions and Advertisements should be addressed to THE PUBLISHERS, *The Indian Medical Gazette*, P. O. Box No. 54, Calcutta.

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Subscribers who so desire may have their copies packed flat in a strong envelope. The extra charge per annum is Re. 1-8 which should be added to the subscription. The envelopes are strongly made, and the *Gazette* is not folded, or creased, in transit.

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The Editors of *The Indian Medical Gazette* cannot advise correspondents with regard to prescriptions, diagnosis, etc., nor can they recommend individual practitioners by name, as any such action would constitute a breach of professional etiquette.

Original Articles

CONGENITAL SYPHILIS

By R. V. RAJAM, M.B., M.S. (Mad.), M.R.C.P. (Edin.)
Venereal Specialist, General Hospital, Madras

It is usually supposed that, in India, most of the infants born of syphilitic parents are either premature or stillborn, or die very soon after birth, and that consequently congenital syphilis is not very much in evidence. Nevertheless in the venereal department of the General Hospital, Madras, a fairly large number of cases of congenital syphilis were examined and treated during the years 1932 and 1933. This study comprises 163 cases of congenital syphilis.

Sex incidence

Age when first seen		Males	Females	Totals
Under 2 years of age.	69	43	49	92
Between 2 and 5 years.	23			
Between 5 and 15 years.	44			
Between 15 and 30 years.	27	40	31	71
	TOTALS	83	80	163

The youngest patient was two months old and the oldest thirty years; 98 per cent of the patients were Hindus. It will be seen from the figures of age and sex incidence that nearly 44 per cent of the cases were of the adolescent or later-childhood variety, and that the males were in excess over the females. It is usually thought that the female of the human species is better able to withstand and survive the invasion of the *Spirochæta pallida* during intra-uterine life, but the large number of adolescent male syphilitics does not confirm this view. It is possible that a greater number of male children die of the effects of syphilis both during intra-uterine life and immediately after birth, but once they manage to be born alive they seem to survive and grow up to adolescence better than the female.

Diagnosis.—In all the cases the diagnosis of congenital syphilis was made either on the clinical findings, or on the serological reaction of the child, mother and father. It was not found possible to get blood samples of all the children examined for the Wassermann reaction. The difficulty of venepuncture, combined with the fear and objection of the mothers to the operation on the first day of examination, prevented us from carrying out the blood test in a number of cases, especially as we wanted to

encourage the regular and systematic attendance of these children for treatment.

The following table shows how the 163 cases were diagnosed:—

Evidence on which diagnosis was made	Number of cases
Clinical findings and positive Wassermann reaction of the children.	68
Clinical findings, but with a negative Wassermann reaction.	15
Clinical findings only, no blood test performed.	60
Suspicious signs in the children with a characteristic maternal history, evidence of past or present disease in the parents, or positive serological reaction of the parents.	20

Clinical manifestations.—The clinical manifestations may be divided into those of early congenital syphilis, and those of tardive or delayed congenital syphilis. The following table gives the clinical manifestations and the number of cases in which they were observed:—

EARLY CONGENITAL SYPHILIS		DELAYED OR TARDIVE CONGENITAL SYPHILIS	
	Cases		Cases
Marasmus ..	15	Late skin lesions ..	20
Skin lesions ..	59	Pigmentary syphilides ..	7
Condyloma, anus ..	36	Radiating scars, mouth ..	6
Snuffles ..	9	Condyloma, anus ..	9
Mouth lesions ..	18	Destructive lesions of the palate and nose ..	16
Genital lesions ..	16	Facies ..	14
Parrot's nodes ..	13	Hutchinson's teeth ..	7
Sunken bridge of nose ..	26	Fournier's molars ..	4
Epiphysitis and periostitis of long bones ..	3	Interstitial keratitis ..	7
Enlarged liver ..	4	Skeletal lesions ..	21
Enlarged spleen ..	6	Sabre tibia ..	8
Alopecia ..	3	Osteosclerosis of femur ..	1
Lymphadenopathy ..	7	Osteomyelitis of femur ..	2
Secondary anemia ..	1	Periostitis ..	4
		Joints ..	6
		Mental backwardness ..	8
		Deafness ..	2
		Myelitis ..	2
		Undersized with infantile sexual organs ..	1
		Past iritis with irregular pupils ..	1

MANIFESTATIONS OF EARLY CONGENITAL SYPHILIS

Marasmus.—A markedly marasmic condition was seen only in a minority of cases. In all of these there were other active lesions on which the diagnosis was based. The majority of infants were well nourished and plump, so that mere wasting or malnutrition has no diagnostic significance.

Early skin lesions.—These were the commonest in infants under one year. The lesions were rarely generalized but had a predilection for the ano-genital region, the area around the mouth, the palms, and the soles. The scaly maculopapule was the constant type. Three cases of pemphigoid syphilides were seen in the series.

Early mucous membrane and muco-cutaneous lesions.—Condylomata of the anus were the commonest lesions and were seen not only in infants but in older children up to the age of 10 years. Another peculiarity we noticed in our cases was that the condyloma is the only one lesion which has a tendency to relapse repeatedly during the first 10 years of a child's life. There was one case of multiple vegetative hypertrophic ulcerating syphilides all round the mouth in an infant one year old (*vide* figure 1).

Parrot's nodes.—These varied from well-marked swelling of the frontal and parietal bones to slight bossing and prominence. In more

periostitis and epiphysitis. The cases with epiphysitis were infants under six months. The affected bones were the humerus and femur. There was one case of severe multiple periostitis



Fig. 1.—Case of multiple vegetative hypertrophic ulcerating syphilides round the mouth.

than half the number of cases the bossing was observed in the frontal bones only (*vide* figure 2).

Sunken bridge of nose.—In no cases of early congenital syphilis in which this deformity was observed was there any evidence of destructive osteitis of the nasal bones or septum of the nose. This deformity is probably the result of arrested development or falling in of the bridge due to the negative pressure induced in the nasal chambers by obstructive rhinitis. There was not only a sinking or flattening of the nasal bridge, but also a tendency to flaring outwards of the alæ nasi.

Early bone lesions.—There were three cases, two of epiphysitis and one of multiple



Fig. 2.—Bossing of the frontal bones.

and epiphysitis involving all the long bones of the body in a child one year four months old (case III and figure 3). In all these three cases there were no cutaneous or mucous membrane lesions.

Enlargement of the spleen and liver.—The enlargement of the spleen and liver was observed only in a small number of cases and in all they were associated with other signs of congenital syphilis.

Lymphadenopathy.—In seven cases painless enlargement of almost all the lymphatic glands in the body was the only evidence additional to the serological reaction and family history.

Secondary anaemia.—There was one case of secondary anaemia, a child three and a half years old whose family history was suspicious and who had enlargement of the spleen, a suggestive facies, and a positive Wassermann reaction.

MANIFESTATIONS OF TARDIVE CONGENITAL SYPHILIS

Late skin lesions.—These were mostly ulcerative, gummatous, or nodulo-cutaneous lesions affecting the legs, the forearms, and the sternal regions.

Pigmentary syphilides.—Pigmentary syphilides were the only evidence in six of the seven cases in which they were observed. They chiefly affected the palms of the hands and the soles



Fig. 3.—Case of severe multiple periostitis and epiphysitis.

of the feet. In all these cases the question of acquired infection was ruled out. They were all under 15 years of age with a positive Wassermann reaction and bad maternal history. In one case, a boy aged seven, the condition was associated with Hutchinson's teeth and radiating scars of the mouth.

Destructive lesions of the palate and nose.—Destructive lesions of the palate and nose include perforation of the palate and septum of the nose, destructive ulceration and scarring of the alæ nasi, pillars of the fauces and soft palate. The youngest patient in whom a perforation was seen was two and a half years of age.

Facies.—The square head, the bossy forehead, the sunken bridge of the nose with increased distance between the eyes and a certain sleepiness or tiredness of look, these constitute the

facies of congenital syphilis. To this may be added, dental deformities and corneal opacities in certain cases.

Hutchinson's teeth.—Two types were seen; one was the typical Hutchinson's incisors with bulging sides, narrow crowns with a notch at the free border; the other type was peg-shaped with considerable distance between contiguous teeth and an antero-posterior thickening.

Fournier's molars.—Only in one case was this associated with Hutchinson's teeth; in the three others, the molars were the only deformity.

Eye lesions.—In all the cases but one there were only residual nebulae of the cornea, the result of past interstitial keratitis; all were females. The youngest was eight years and the oldest was 25. There was one case of a male aged 16 with irregular fixed pupils, the result of past iritis; he showed other evidence of congenital syphilis and had a positive Wassermann reaction.

Skeletal lesions.—Bones. The sabre deformity of the tibia was the commonest bone affection observed in cases of tardive congenital syphilis. The sabre deformity varied from slight anterior bowing to excessive bending. More important than the anterior curvature was the well-marked thickening of the bone, either diffuse, or localized to the centre of the lower third of the bone. The condition was invariably bilateral and marked degrees of it were associated with flat feet. The cases with gummatous osteomyelitis of the femur had also synovitis of the adjacent knee joint. There were four cases of osteoperiostitis affecting the other bones, humerus, radius, clavicle and fibula.

Joints. Four were cases of chronic hydrops affecting the knee joints. In all but one the affection was bilateral. X-rays showed no abnormality in the joints or bones. Two were cases of multiple osteo-arthritis with marked articular changes and periosteal new bone formation of the bones (case VIII).

Mental backwardness.—The patients were mostly males with ages varying from 6 to 20. The defect was slight, not amounting to feeble-mindedness or idiocy, except in one patient who was a definite idiot with a simian physiognomy, gummatous ulcers of the leg and sabre deformity of the tibia.

Myelitis.—One was a boy and the other a girl. They had a positive Wassermann reaction with other stigmata of congenital syphilis (case VII).

Illustrative cases

I. Male infant, 5 months old; third and last child of the parents.

Clinical condition. Marasmic, maculopapular and scaly eruptions on the trunk and the limbs; indurated ulcer of the umbilicus; ulceration of circum-oral region buttocks and anus; marked alopecia of the scalp. Blood test not available.

Mother. Clinical condition: Pregnancy three. First was a premature birth, and second died two months after birth. Involuting papular syphilides on the trunk and limbs.

Note.—The indurated ulcer at the navel of the infant with universal cutaneous eruptions and the active lesions in the mother suggested post-natally acquired infection, but the maternal history was very suggestive of congenital infection. This child did well with treatment.



Fig. 4.—Case III, male, aged 16 months, showing periostitis and epiphysitis.

II. Male child, A, aged 3 years; the second child of the parents.

Clinical condition. An indurated erosive chancre of left lower eyelid; left submaxillary glands enlarged, hard and painless; diffuse maculopapular syphilides all over trunk and limbs; no evidence of congenital lues. Blood Wassermann strongly positive.

Male infant, B, seven months old, the brother of A, and the fourth child of his parents.

Clinical condition. Well nourished and plump; square head and olympic forehead; bridge of the nose sunken; scaly and pustular syphilides on the buttocks, palms, and soles. Blood Wassermann strongly positive.

Mother of A and B, aged 20 years. Four pregnancies; first child is alive and well; third was stillborn. Extensive condylomata of the labia, perineum and anus. Blood Wassermann strongly positive.

Father, aged 30; history of chancre after the second child (A) was born. A few erosive papular syphilides on the inner aspect of prepuce and on the mucous membrane of the lips and palate. The patient reported that he had been getting these sores repeatedly.

Note.—In this group of cases the second child (A) must have been infected by contact with the parents. Hence the chancre of the eyelid and the diffuse cutaneous lesions. The absence of signs of congenital lues is indicative of acquired infection. The father's history also supports this. The fourth child (B) is a definite congenital syphilitic and the stillbirth between the second and fourth child is indicative of antecedent infection in the parents, before the fourth child was born.

III. Male child, aged 1 year 4 months; the first and only child of its parents born after 18 years of married life.

Clinical condition. Thin, wasted and under-developed for its age; bossy forehead, and sunken bridge to the nose; bluish sclerotics; multiple tender swellings of almost all the bones of the limbs, periostitis and epiphysitis (*vide* figure 4). Blood test not available.

Mother. No clinical evidence of syphilis. Blood Wassermann strongly positive.

Father. Denies any history of syphilis. No clinical evidence. Blood Wassermann positive.

Child did very well with treatment.

IV. Female child, M, aged 1½ years; sixth and last child of its parents.

Clinical condition. Annular syphilides, face and neck; depressed bridge of the nose. Blood test not available.

Female child, N, aged 9 years, sister of M, and the first child of the parents.

Clinical condition. Sunken bridge of the nose; Hutchinson's teeth; periostitis of tibia. Blood Wassermann positive.

Mother of M and N, aged 25 years; six pregnancies of which four were miscarriages. No clinical evidence of syphilis. Blood Wassermann strongly positive.

V. Female, child X, age 7; second child of its parents.

Clinical condition. Faeies suggestive of congenital syphilis, radiating scars round mouth, bossy forehead, and sunken bridge to nose; undersized for its age. Blood Wassermann strongly positive.

Female child, Y, age 1½ years; sister of X and last child of its parents.

Clinical condition. Snuffles; sunken bridge to nose; enlargement of the spleen; condyloma at anus. Blood result not available.

Mother of X and Y, age 25; pregnancies seven; only two children, X and Y, alive; two stillbirths; the other three died soon after birth. No clinical evidence of syphilis. Blood Wassermann strongly positive.

VI. Female child, aged 8; fourth and last child of its parents; was attending for chronic otitis.

Clinical condition. Intelligence below average; undersized for its age; slightly deaf in both ears; multiple patches of leucoma right cornea (history of eye trouble three years ago); left upper incisor is very

suggestive of Hutchinson's sign. Blood Wassermann strongly positive.

Mother, age 35, four pregnancies; first three children died soon after birth. No clinical evidence of syphilis. Blood Wassermann strongly positive.

VII. Male, aged 10, no family history could be obtained.

Clinical condition. Patient extremely emaciated; old man appearance; bossy forehead; upper incisors absent; Fournier's molars; multiple nebulae both cornea; pigmentation and keratoderma soles of both feet; flaccid paralysis of both lower extremities with sensory loss up to the umbilicus; incontinence of urine and faeces; large trophic ulcers sacral both trochanteric regions and both heels; mentally backward. Blood Wassermann strongly positive.



Fig. 5.—Case IX. Hutchinson's teeth.

Note.—A case of neglected myelitis in a congenital syphilitic

VIII. Male, aged 12 years; an orphan and the only surviving member of a family of 4 children.

Clinical condition. Multiple gummatous punched-out ulcers on both legs; multiple osteo-arthritis of left elbow and both knee joints—duration six months. X-ray showed characteristic changes of osteo-arthritis. Blood Wassermann strongly positive.

IX. Male child, aged 8; first child of his father by the second wife.

Clinical condition. Pigmentation of alae nasi; radiating scars round the mouth; peg-shaped Hutchinson's incisors (*vide* figure 5); leuco-melano-dermia of both palms of the hands; intelligence above the average for his age. Blood Wassermann strongly positive. Both the

father and the mother have the same leuco-melanodermic condition of the palms with blood Wassermann strongly positive.

This boy has been attending regularly and has finished three courses of arsenic and bismuth. His Wassermann reaction is still strongly positive; his cerebrospinal fluid is normal; the condition of his palms for which he came to the hospital is very slow to improve.

X. Male, aged 13; was being treated for kala-azar; family history not available.

Clinical condition. Patient emaciated and anæmic; marked enlargement of the spleen and liver; slight ascites, typical Hutchinson's teeth and mulberry molars; sabre deformity of both tibiae; pigmentation of palms and soles. Blood Wassermann strongly positive.

XI. Male, aged 14; no family history could be obtained.

Clinical condition. Boy extremely emaciated; suspicious facies; extensive nodulo-cutaneous ulceration and scarring of the right forearm and hand with flexion contracture of the right elbow and elephantoid clubbed contracted fingers and hands (*vide* figure 6). Similar but limited ulceration and scarring of the left elbow region. X-ray showed disorganization of the phalangeal bones of the little finger with considerable rarefaction of the other bones of the hand, wrist and forearm on the right side (*vide* figure 7). Such an affection of

so remarkably that he put on nearly 20 pounds weight in four months. An amputation was performed on the deformed and functionally-useless right forearm and hand.

XII. Female, aged 16; unmarried; second child of her mother.



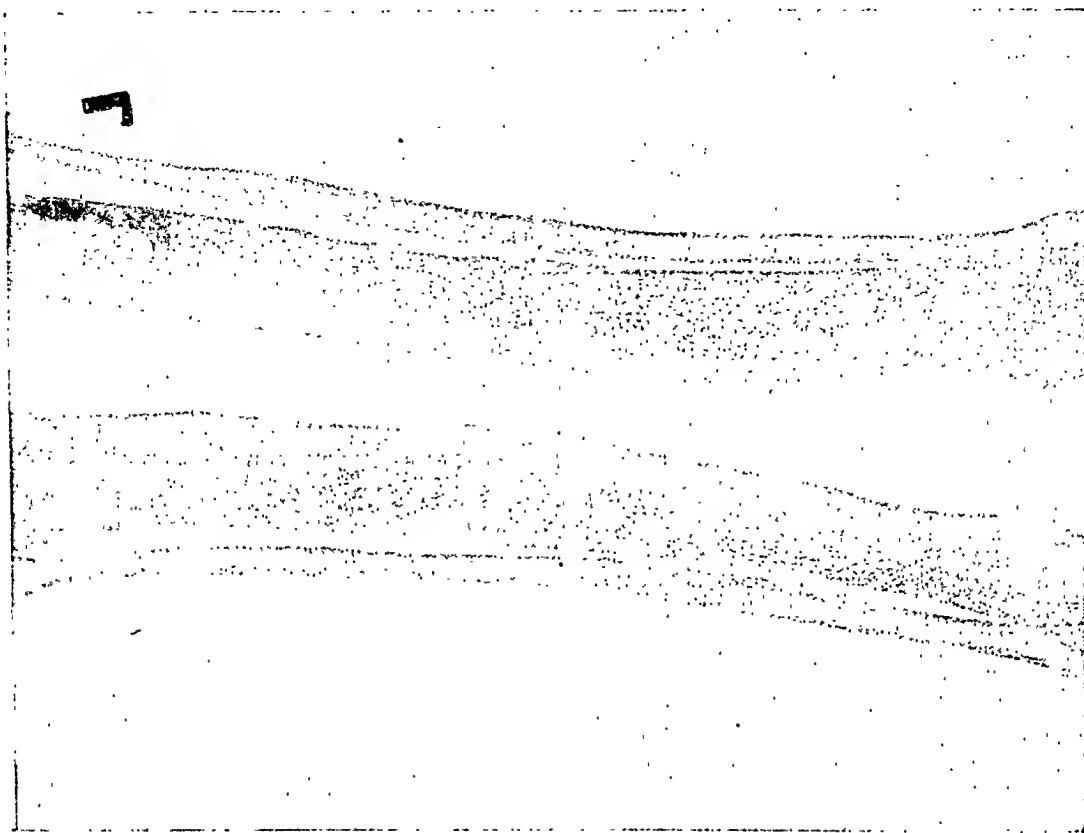
Figs. 6 and 7.—Case XI.

the bones in syphilis seemed unusual. The patient had also osteosclerosis of the lower half of right femur. Blood Wassermann was strongly positive. With vigorous anti-syphilitic treatment the ulceration healed up completely and the patient's general condition improved

Clinical condition. Came in with perforation of the soft palate, no other evidence of congenital syphilis; a history of cutaneous eruptions in childhood and eye-trouble in her tenth year was volunteered. Blood Wassermann strongly positive.

Mother. Nine pregnancies of which two were still-births and three children died within a few days of

XIII. Male, aged 20; no family history could be obtained.



Figs. 8 and 9.—Case XV.

birth; the other children are well. Mother's blood Wassermann was strongly positive.

Clinical condition. Typical facies, square head, olympic forehead, flattened bridge of the nose with

deformed ala nasi, radiating scars round the mouth; patient considerably undersized for his age; sabre deformity of the right tibia; intelligence much below average; penis and scrotum infantile; has a shrill high-pitched voice. Blood Wassermann strongly positive.

Note.—In this case there seems to be a profound effect on the internal secretions and growth in addition to the stigmata.

XIV. Female child, C, aged 3 years; the first child of its parents.

Clinical condition. Bossy forehead, and sunken bridge to nose. No other evidence of congenital lues. Blood Wassermann strongly positive.

Male child, D, age 1½ years; the brother of C and the second child of his parents.

Clinical condition. Square head, bossy forehead, and markedly depressed bridge to nose; no other evidence of congenital lues. Blood Wassermann negative.

Mother of C and D, aged 23, is now pregnant five months. No history or evidence of syphilis. Blood Wassermann negative, even after provocation.

Father of C and D, aged 24; no history or clinical evidence of syphilis, either acquired or congenital. Blood Wassermann strongly positive.

Father's mother, age 54; pregnancies 16 of which the only surviving member is the father of C and D; she had 8 stillbirths and 7 children died soon after birth. No clinical evidence except the complaint of a boring pain in the right thigh. Doubtful osteosclerosis of right femur. Her blood Wassermann is strongly positive.

Note.—The clinical condition of the two children with a positive Wassermann in one, the absence of clinical or serological evidence of syphilis in the mother, the positive Wassermann reaction of the father in the absence of history or evidence of acquired infection, the bad obstetrical history of the grandmother with a positive Wassermann reaction are the peculiarities in this group of cases and suggestive of third generation syphilis.

XV. Female, aged 25, unmarried; no family history could be obtained.

Clinical examination. Patient undersized for her age; mentally backward; typical facies, markedly sunken bridge to the nose; active interstitial keratitis eyes; Hutchinson's incisors; breaking down gumma of the upper end of the sternum; marked thickening and anterior curvature of tibiae with multiple scars over it. Pigmented palms. Blood Wassermann strongly positive (*vide* figures 8 and 9).

Note.—This is a case with active lesions and typical stigmata of congenital syphilis at such an advanced age. The curvature of the tibia is rather extreme and suggests a rachitic element also. The active lesions responded well to treatment.

XVI. Female, aged 30, married; four pregnancies, the first three children died soon after birth, the fourth child, 2 years old, has flaccid paralysis of both legs with atrophy.

Clinical condition. Pigmented palms; nebulae both cornea; history of having had interstitial keratitis when she was ten years old with recurrence of the trouble frequently for which she had received injections; no other evidence of congenital lues. Blood Wassermann strongly positive.

The question in this case is whether she was a congenital syphilitic and whether her bad obstetrical history was due to the connubially-acquired disease. It is suggestive, but not conclusive in the absence of information regarding the husband's status. Her child with flaccid paralysis of the legs has no evidence of congenital lues and the blood Wassermann is negative.

XVII. Male, Anglo-Indian, aged 11 years, the eldest child of his parents; a prematured child, seven months, well until now.

Clinical condition. Slight bossiness of the forehead; chronic hydrops of the left knee of 8 months' duration; the knee trouble started after some trivial injury; it was treated with plaster of Paris with no benefit; x-ray

showed no abnormality in the bones of the joints. Blood Wassermann strongly positive. Was put on anti-syphilitic treatment and the joint condition responded rapidly.

Mother of the patient, age 27, is the eighth in a family of 10 members, of which only five are alive. The rest died soon after birth. Her younger brother, ninth in the family, has been a paralytic for 13 years; *see* history below. She was married in her 15th year; has had seven pregnancies; the fifth and sixth children died young.

Well developed and healthy looking; no other evidence of congenital syphilis except Hutchinson's incisors. Wassermann reaction negative. History of husband not available.

Maternal uncle of patient, aged 25 years; in his twelfth year he suffered from paralysis of both legs, and loss of vision both eyes. His blood Wassermann then was strongly positive. He was treated with mercury injections and recovered from the attack; had another attack of complete paralysis in his 21st year, i.e., 4 years ago, with sphincter trouble and sensory loss; had a series of novarsenobillon injections in one of the local hospitals and he partially recovered.

Now, he has slight flaring of the nostrils; Hutchinson's incisors with a notch at the free margin; no other stigmata of congenital lues; spastic gait; walks with a stick; tendon jerks markedly exaggerated; no loss of sensation and no sphincter trouble; intelligence above average. Blood Wassermann negative, even after provocation.

Note.—The infection in the boy is suggestive of third generation syphilis for the following reasons; the bad obstetrical history of the mother's parents, the solitary stigmata in the mother (Hutchinson's teeth), the history and clinical condition of the uncle. In both the mother and the uncle, the blood Wassermann was negative; this is not surprising in view of the long duration of infection. Of course a serious defect in the evidence for third generation syphilis is the absence of any information regarding the status of the father of the boy.

TREATMENT

The combined therapy with arsenic and bismuth is the routine treatment employed. In infants and children with poor veins the intramuscular injection of one of the sulfarsenobenzenes was the route of choice; in the others, neosalvarsan intravenously was given. In marasmic, very emaciated infants, dribble doses ranging from 0.0075 to 0.025 gramme were given on alternate days, and when the infant's general condition improved higher doses were employed. It is remarkable how children and adolescents stand continued arsenic and bismuth therapy without showing any signs of intolerance. Large doses are borne without any untoward results. The doses employed in the department are as follows:—

	Weekly dose of sulfarsenobenzene or neosalvarsan	Weekly dose of bismuth metal
Under 1 year ..	0.05 to 0.075 gramme.	0.05 gramme
Children between 2 and 5.	0.075 to 0.1 gramme.	0.05 to 0.075 gramme.
Children between 5 and 15.	0.1 to 0.2 gramme	0.1 to 0.15 gramme
Above 15 years	0.2 to 0.3 gramme	0.1 to 0.2 gramme

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THE TOXIC EFFECTS OF EMETINE

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ALTHOUGH emetine is a drug extensively used in this country, the toxic effects produced by it are not always fully appreciated by the profession. During the last 12 years the author has treated a large number of cases of amœbiasis with emetine in the Carmichael Hospital for Tropical Diseases, and has met with untoward effects in spite of all precautions. Apart from these, many patients suffering from emetine poisoning have come to the hospital for relief of their symptoms. In this paper it is proposed to deal briefly with various toxic symptoms produced by this alkaloid, many of which could be avoided if it were realized that emetine is a

(Continued from previous page)

The doses employed above are higher than those usually recommended, but we have had no ill results. We tried stovarsol tablets by the mouth in a number of infants who were thought too ill to stand injections, but our results were not encouraging.

PROGNOSIS

It is much easier to prevent congenital syphilis than to cure it. Even in the early stages of the disease one has got to deal with a firmly entrenched infection. It is possible to cure the disease within the first six months of the child's life by intensive and prolonged treatment. In the later years of childhood and adolescence, treatment may affect the clinical quiescence of the disease. In the later childhood and adolescent cases, the Wassermann reaction remains unaffected by treatment though there is a great improvement in the general condition.

CONCLUSION

There is a good deal of congenital syphilis in this part of the country which is not surprising considering the high incidence of acquired infection in the population and the imperfect treatment, or the absence of any treatment at all, of the acquired infection. The large number of untreated adolescent congenital syphilitics in our series, mostly of the male sex, is a striking feature. The problem of third generation syphilis requires more investigation by all the workers who treat syphilis. We have seen two cases in which the possibility of the infection being transmitted to the third generation, one through the mother and the other through the father, is suggested.

I am indebted to Dr. Mathuranayagam, the lady in charge of the female side of the department, who was of considerable help in preparing this article. My thanks are also due to the director and staff of the x-ray institute for the illustrations and x-rays.

potent drug having a powerful action on the vital organs, and that it should be given with great care.

Toxic effects in animals

That emetine is a toxic drug has been amply shown by experiments on animals. With large doses, the changes produced in the tissues are of an acute nature, and immediate death within 24 hours may be produced with one single large dose. Doses of 0.05 to 0.075 gramme per kilogramme in dogs, and 0.02 to 0.15 gramme per kilogramme in rabbits, guinea-pigs, rats, etc., are rapidly fatal. With medium doses the pathological changes are more marked, more time being allowed for their production. With smaller doses it takes longer to produce the same pathological changes, indicating a cumulative action of the drug. There is probably no threshold of safety when the drug is administered continuously.

It should be realized that emetine attacks all tissues and therefore is a general protoplasmic poison; changes in the kidney, liver, heart and skeletal muscles are identical, all showing hyperæmia, cloudy swelling and degeneration of the cells.

Cardiovascular effects.—On the heart of both cold-blooded and warm-blooded animals, emetine has a markedly toxic effect. It depresses the excitability and conductivity of the myocardium and produces slowing and dilatation of this organ resembling that produced by chloroform. The heart becomes irregular, auricular and ventricular dissociation may be produced, and death may occur from ventricular fibrillation, the heart stopping in diastole. In animals intravenous injections of large doses produce a marked fall of blood pressure; after small doses the pressure soon regains its normal level. The fall of pressure is due partly to the direct toxic action of the drug on the heart, but vasomotor paralysis is an important factor especially after large doses. In man there is an appreciable fall of blood pressure, to the extent of about 20 millimetres of mercury, after an intravenous injection or after a number of doses by the other routes. The characteristic rapid and compressible emetine pulse and cardiac irregularities of various types are seen after a series of injections of this alkaloid. The isolated heart is slowed and weakened by both emetine and cephaline, and it finally stops in diastole.

Non-toxic doses, while they lower the carotid pressure in animals, produce a rise in the pressure both in the pulmonary artery and vein. Larger doses dilate the pulmonary vessels. The coagulation time of the blood is not altered though some think it is delayed. Emetine is toxic to the capillary endothelium producing petechial hæmorrhages; local application of the alkaloid gives rise to capillary hæmorrhage.

Effects on the nervous system.—The alkaloid has a powerful effect on the nervous system. In the frog, emetine produces a slowly advancing

No general disturbances or gastro-intestinal symptoms are produced in man when a therapeutic dose is given by injection; local reaction as a rule is small when the solution is neutral. Larger doses cause nausea, vomiting and diarrhoea. As much as 0.25 gramme has been given for a single dose without producing any other symptom except persistent nausea, but if a very large dose of emetine is given the patient may suddenly faint, and death may occur from paralysis of the heart. When repeated injections of small doses are given, there is persistent nausea and vomiting, diarrhoea, vertigo, extreme muscular weakness and expiratory dyspnoea; the pulse is at first slow and then rapid. Death results from exhaustion, gastro-enteritis or intercurrent inflammation of the lungs. It should be remembered that there may be wide differences

in the toxicity of various commercial samples of emetine on the market.

Clinical experience has fully established the fact that emetine is a cumulative poison in man. The dosage and the length of time during which it should be given have therefore to be very carefully considered. Formerly, untoward effects from its use were put down to the disease being treated and this accounts for such a diagnosis as post-dysenteric heart failure. Recent investigations have shown that undoubted cases of sudden failure of the heart have been produced by prolonged use of emetine. The depressing effect of the drug, when given in doses of one grain daily for some time, is very marked, the noticeable features making their appearance after the fourth to sixth injection, being the loss of appetite, nausea, vomiting, vague abdominal pains and diarrhoea due to gastro-intestinal irritation. Among the serious symptoms of poisoning are an increased pulse rate, listlessness and cardiac and mental depression. There may be general lassitude, disinclination to make an effort, weakness of the legs, tremors of muscles, globus hystericus, cardiac arrhythmia, low blood pressure and a feeling of faintness. General oedema, petechial hæmorrhages, purpuric skin rashes, hæmoptysis and signs of cerebral and pulmonary oedema may also be present. Albuminuria frequently occurs. Polyneuritis is common and in some cases difficulty in swallowing and a feeling of constriction about the throat and chest have been observed. Urticaria and large pruriginous plaques, persisting sometimes for a month after the last injection, have been known to occur even after a few injections of the alkaloid. A number of such patients have come to this hospital for treatment. Sudden collapse and death may supervene in some cases. Auscultation of the heart in emetine poisoning shows similarity of sounds, and a lack of the muscular element in the first sound. Cardiac stimulants should be used in such cases at the earliest possible moment when the signs of cumulative toxic effects have appeared. Degenerative changes were recorded by Bais (1921) in human beings after prolonged use of the drug. The author and his co-workers (1924) demonstrated that in rabbits marked histological changes of a degenerative type occur in the heart after emetine injections. These consist of cloudy swelling, disappearance of the transverse striations and atrophy and fibrosis of the muscle. Chopra and Sen have shown that degenerative changes may be produced in the myocardium after therapeutic doses of emetine which can be detected by electrocardiographic examination.

Emetine neuritis.—Neuritis of the lower extremities is one of the early symptoms and is manifested at first by weakness in the legs, difficulty in walking and interference with the normal reflexes. Usually there is no pain on pressure as the motor nerve fibres only are affected, but cases of painful neuritis have been observed. Wrist drop, ankle drop, and toe drop

may rarely be produced though we have not observed them in our series; hyperæsthesia of the soles of the feet, sluggish knee jerks, and loss of taste have been noticed in some patients. It is possible that difficulty in swallowing and the sensations about the throat and chest produced after emetine injections are due to involvement of the nerves supplying those parts; it has also been suggested that these effects may be due to changes in the nuclei in the medulla oblongata similar to those that have been observed in animals in the cells of the anterior horn of the spinal cord. In some individuals symptoms are produced after 8 or 9 grains of the alkaloid. Palsy may develop some considerable time after the cessation of treatment. Fibrotic changes have been observed in experimental animals after large doses of emetine and similar changes probably occur in man. Emetine has not been detected in the cerebrospinal fluid.

Emetine diarrhoea.—Emetine when given in considerable quantities produce diarrhoea. It has already been pointed out that in animals emetine may produce gastro-enteritis with hæmorrhages in the lymphatic glands, spleen, kidneys and thymus. These experimental animals die even though emetine is discontinued directly the symptoms appear. Diarrhoea which is the first sign of irritation of the gastro-intestinal tract was quite common in the old days, the rationale of ipecacuanha treatment being to push the remedy till profuse diarrhoea was produced and the stools became liquid and of a canary-yellow colour. After discontinuing the drug the stool assumed its normal consistency and to all intents and purposes the patient was considered cured. Low (1915) noticed that diarrhoea (occasionally with blood) occurred after hypodermic injections, but not so commonly as when ipecacuanha was given by the mouth. It is not unusual for the patient to get a slight attack of diarrhoea after the sixth injection. With the oral administration of emetine-bismuth-iodide, diarrhoea is frequently met with, and when mild this is considered to have a beneficial effect and is not a sign of intoxication. In addition to the specific action of the drug, the bowel is at the same time thoroughly washed out and this mechanical process is valuable, as is evident from the successful treatment of bacillary dysentery with saline purgatives.

Cautions and contra-indications.—Emetine is a protoplasmic poison acting equally on most of the tissues of the body, heart failure being the actual cause of death. In cases where the heart or kidney is affected, it is advisable to give as small doses as possible for the treatment of dysentery. In otherwise-healthy individuals the number of injections should be limited as far as possible to nine, and under no circumstances should more than one grain be given in 24 hours.

It should be remembered that emetine, if administered continuously, depresses the heart, but signs of cardiac depression improve when it is withdrawn. Caution is indicated in all cases

where the myocardium is damaged by other diseases, such as malaria (malignant form), influenza, and diphtheria. The patient should be confined to bed during the period of emetine treatment and an accurate record of the pulse rate should be kept. If this is definitely increased, or palpitations occur, the drug should be withheld till the heart resumes its normal rate. Under no circumstances should a course of emetine injections be given in ambulatory patients.

Convalescents who have received a course of emetine should be allowed to leave the bed very cautiously to allow the effects of the drug to pass off, and, if the pulse rate increases much, they should return to bed. The author has seen patients whose hearts were permanently strained for want of this precaution. It is necessary to emphasize at the risk of repetition that emetine is a powerful drug having a selective action on the heart muscle and that great care should therefore be taken when it is being used.

Emetine in pregnancy.—It has been suggested that emetine should be avoided in pregnancy as it may cause abortion. Some pharmacologists have stated that emetine increases the contractions of the uterus and have issued a warning against its use in pregnancy. On the other hand clinicians have given injections of emetine in advanced cases of pregnancy without untoward results. Recent investigations have shown that after a dose of one grain, assuming that the whole of the alkaloid is absorbed, the concentration of the drug in the blood cannot possibly be greater than 1 in 150,000 to 1 in 100,000. Such dilutions have little effect on the isolated uterus, and if there is any action at all, it is a tendency to relaxation. Acton and Chopra showed that abortion is more common in cases of bacillary dysentery and is produced by the bacterial toxins; they showed that the toxin of *B. dysenteriae* (*Shiga*) is a powerful ecboic. Emetine does not appear to be a causative factor in producing abortion and the coincidence of a miscarriage when injections are being given seems to be due to the toxins of the parasite rather than to the drug. Pregnancy is not therefore a contra-indication to the use of emetine. In menstruating women it is preferable to start the injections after the period is over, but in urgent cases treatment should not be deferred.

REFERENCES

- Bais, W. J. (1921). *Geneesk. Tijdschr. Nedcr.-Indie*, Vol. LXI, p. 500.
 Chopra, R. N., and Ghosh, B. N. (1922). *Indian Med. Gaz.*, Vol. LVII, p. 248.
 Chopra, R. N., Ghosh, B. N., and De, P. (1924). *Ibid.*, Vol. LIX, p. 338.
 Chopra, R. N., Gupta, J. C., and Pillai, K. V. (1928). *Indian Journ. Med. Res.*, Vol. XV, p. 883.
 Dale, H. H., and Dobell, C. (1917). *Journ. Pharm. and Exper. Therap.*, Vol. X, p. 399.
 Low, G. C. (1915). *Brit. Med. Journ.*, Vol. II, p. 714.

DIAGNOSIS AND TREATMENT OF SOME URINARY COMPLICATIONS IN GYNÆCOLOGY*

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THERE is no need to stress the very close developmental connection between the urinary and generative systems. I have felt however that in our wards and theatres the clinical and pathological connection might receive more attention, not merely on account of its very great technical interest, but also because recognition and correction of injuries and disorders of the urinary organs can be of incalculable benefit to many of our patients.

It is not my intention in the present paper to deal systematically with the very wide field of urology as met with in our gynæcological and obstetrical wards, but rather to refer to a few cases and conditions in my own experience which have been of great interest to me and which I hope will similarly interest you.

Injuries to ureters

A review of recent literature both of urology and of gynæcology reveals a recognition that injuries to ureters occur more frequently than is often supposed, especially in the practice of gynæcological surgery. As an example, we perform a difficult hysterectomy for carcinoma or a broad ligament tumour; we have not perhaps been able satisfactorily to trace out the ureters to their entry into the base of the bladder and are a little doubtful in our minds as to whether in tying off the troublesome vessels of the broad and utero-sacral ligaments we have avoided the ureter; or in clearing the ureter from its bed we suspect we have denuded it so that its walls cannot resist the unfavourable contact with the raw and perhaps infected tissues left behind. In the days immediately following operation, we look fearfully for suppression of urine or for urinary leakage from the vagina; neither appears and we say 'no harm done'; but the patient has a very stormy convalescence and a lot of pain in one side, which probably ultimately settles down more or less, without our having formed any clear idea as to its origin. We have in fact tied off the ureter on that side accidentally without realizing it and the patient owes her recovery to the adequacy of her remaining kidney.

Whilst rare, this happens I believe more often than we realize. I have notes of one such case where I afterwards verified the injury by cystoscopy and of another case where we suspected it but proved it had not occurred.

* Being a paper read before the Tenth All-India Medical Conference, 1933 (Section of Gynæcology).

The recognition of this accident is quite easy by chromocystoscopy, which gives clearer and more precise information on this and many other urological conditions than excretion urography (with uroselectan for example) behind which so many gynæcologists shelter. It is only when the bladder walls are greatly distorted that it may not be possible to locate with the cystoscope the points of entry of the ureters into the bladder and to watch for the indigo-carminic, which we have caused to be injected into the patient's veins or muscles, to appear from them.

Having recognized by these or other means that a ureter has been ligated, we have three possible courses open to us :

1. We may re-operate to divide the ligature, an exceedingly difficult procedure indeed.
2. We may leave things as they are (if the other kidney appears adequate).
3. We may do a nephrostomy as a temporary or permanent expedient.

Which of these three courses we adopt will depend on the conditions present in the case in question; if by ill fortune both ureters have been tied and anuria results, a condition to be diagnosed by finding the absence of all secretion *via* the ureteric orifices (as seen by the cystoscope) associated with blockage at an appropriate distance to the passage of a ureteric catheter up each ureter in turn, a rapid bilateral nephrostomy will probably be the only means of saving the patient. There are great technical difficulties in finding and releasing the ligature which occludes the ureter, at a secondary operation.

Uretero-vaginal fistula.—This is practically always traumatic (*i.e.*, the result of operative trauma, sometimes unavoidable). It is characterized by a urinary discharge from the vault of the vagina whilst at the same time the bladder continues to fill and empty regularly under normal control. It is very important to distinguish this condition from two others, *viz.*, a very small vesico-vaginal fistula, and a weak sphincter. The three conditions are liable to be confused especially in an uneducated patient. In all three the vagina is wet whilst the filling and emptying of the bladder continues. The diagnosis of uretero-vaginal fistula can usually be made without difficulty by chromocystoscopy, when we see the indigo-carminic coming down one ureter and not the other. There is, however, a very useful and practical test, which I do not remember to have seen described and which we call the 'two swab test'. You put a dry cotton swab into the vault of the vagina and another one below it in the lower half of the vagina. Then put two ounces or so of methylene blue solution into the bladder which has been previously emptied by catheter. After waiting two or three hours the swabs are withdrawn and examined. If the upper one is blue the leak is from the bladder; if the lower one only, then it is a case of weak sphincter.

To distinguish a small vesico-vaginal fistula from a uretero-vaginal fistula, repeat the test twice, first as above and the second time after emptying the bladder give a dose of intravenous indigo-carminic. In uretero-vaginal fistula, the upper swab will be colourless the first time but coloured the second.

Uretero-vaginal fistulae cannot be cured by operation *per vaginam*. It is therefore essential not merely to diagnose them from vesico-vaginal fistula, but to decide for certain from which ureter the leak is taking place. This can only be done by a cystoscopic examination. It would be a great tragedy for a patient suffering from a fistula from the right ureter opening perhaps into the left vaginal vault to have the left kidney removed to cure it.

We had one case where there was spontaneous cure. The vaginal leak ceased and the ureter was found to be emptying normally into the bladder. In such a case, it is probable that the main continuity of the ureter has not been interrupted but a small lateral opening has been made. This is called an incomplete uretero-vaginal fistula and might afford a chance of cure by operation from below. Spontaneous closure occurs more often; this involves occlusion of the ureter by scar tissue and consequent destruction of the kidney function on that side.

We had two other cases of traumatic uretero-vaginal fistula, one following a Wertheim's hysterectomy and the other a vaginal hysterectomy for prolapse. The latter case we treated in the following way. We exposed the pelvic portion of the ureter extraperitoneally through a median hypogastric incision and re-implanted it into the bladder. The case was cured by this and the kidney on that side continued to function so long as the patient was under observation; as this was only a few weeks, we cannot say more. It is said that these cases often end in gradual loss of kidney function on the affected side.

In the second case, where we had operated for carcinoma of the cervix, I did not like to reopen the tissues in the above way, but preferred to do a nephrectomy after ascertaining that the other kidney function was normal. This gave a very satisfactory result to the great comfort of the patient.

Vesico-vaginal fistula.—The secret in successful operation in these cases is free mobilization of the bladder. Provided this can be accomplished, cure can be effected in nearly all cases. Perhaps on this side of India we see less severe cases than occur elsewhere, but we have very rarely failed to cure, though we occasionally have to operate a second time to complete the closure. I am convinced that wide dissection and free mobilization of the bladder are all-important. In recent years I have only seen one case where the only resort was rectal implantation of the ureters, and this we did

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RELAPSING MALARIA

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CASES of obstinately relapsing malaria are of frequent occurrence in all parts of the tropics, and nowhere more so than in Assam where malaria constitutes one of the major problems which the medical profession is called upon to solve.

The treatment of relapsing malaria is very inadequately described in most of the standard textbooks on tropical diseases and the impression is generally conveyed that relapses should be dealt with in the same way as the original attack. Little attempt is made to discuss the part played by the patient in finally establishing a cure and the fact that malaria is a self-limiting disease is entirely ignored.

The following notes are descriptive of such a case and are presented because they illustrate one or two points which may possibly be of general interest.

The patient is an European lady, aged about 33 years, who has been resident in Assam for about 10 years.

The husband of the lady developed an attack of malignant tertian malaria on the 27th August, 1933, the blood films showing a fairly heavy infection. As former experience on several occasions had proved that when her husband contracted malaria she was almost certain to have a similar attack, she requested me to give her

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after the technique of Green-Armytage and obtained a very successful result, verified some months after.

Pyelitis.—These cases often give most gratifying results to lavage treatment *via* the ureters with the ureteric catheter. We use a 5 per cent. solution of argyrol and it must be done without any anaesthesia to avoid over-distension of the kidney pelvis. It is first essential to exclude either renal calculus or renal tuberculosis as the cause of the pyelitis. In cases where urinary antiseptics fail, this form of treatment is most valuable. Here is an illustrative case, from the Motlibai Hospital:

Mrs. A. S., Hindu, aged 25, eighth pregnancy, seven months pregnant. Admitted on 27th October, 1933, for fever and cough for past three days.

Previous pregnancies normal, all children living, youngest aged 2 years.

On admission looked ill and wasted. Irregular fever, albumin and pus in her urine; culture revealed *B. coli*. Blood pressure 110/60; Widal negative.

No response to urinary antiseptics.

Therapeutic induction on 11th November, 1933. Fever fell to normal on 18th November and patient began to pick up. Became very ill again on 27th November. High irregular fever, rapid wasting, patient looked desperately ill; many pus cells in urine. No response to various urinary antiseptics. Kidney lavage (5 per cent argyrol) performed on 1st December. Temperature fell to normal next day, remained down and patient rapidly improved. Discharged in good condition on 17th December; very few pus cells in the urine.

some form of prophylactic treatment. It was therefore decided to try the efficacy of a course of atebtrin and plasmochin. The dose given was 0.1 gramme of atebtrin thrice daily for five consecutive days together with 0.01 gramme of plasmochin for the same period.

This treatment was commenced on the afternoon of 27th August and was completed on the morning of 1st September.

On 5th September, the patient complained of sickness, vomiting, and headache with slight rigor accompanied by a temperature of 100.8°F. Symptoms began about 8 a.m. and the temperature continued till 6 p.m. Blood films (thick and thin) were examined on the 5th morning and again in the evening of the same day but were negative, even after prolonged search.

Blood was again examined on the 6th and was still negative, although six slides in all were searched.

Although the symptoms were indicative of clinical malaria, no treatment was adopted in the absence of a definite finding in the films examined. Blood was examined on the 7th, 8th and 9th, but remained negative. On 25th of September, there was a mild recurrence of the same symptoms with temperature ranging from normal to 100.4°F. at midday.

17th October. The clinical symptoms of malaria again manifested themselves. Six blood films were examined on the 17th, and found negative. Blood was examined daily from 17th to the 21st.

21st October. Blood films showed malignant tertian malaria. Temperature 102°F. Patient was given 10 grains of quinine bishydrochloride intravenously and on the following day a course of atebtrin and plasmochin was started. Atebtrin was given in doses of 0.1 gramme thrice daily for 5 days and plasmochin in a dose of 0.02 gramme once daily on the 3rd, 4th, and 5th days, but not on the first two days after the onset. After completion of this treatment, nothing was given for 3 days and then a further two days treatment was exhibited, atebtrin, 0.1 gramme thrice daily and plasmochin 0.02 gramme once daily at bedtime being administered. Blood films were negative from the 24th, and were examined daily until the 31st, remaining negative during that period.

28th November. There was a recurrence of malarial symptoms on this date. Blood films showed malignant tertian rings on the thick film only. Treatment began with 10 grains of quinine bishydrochloride intramuscularly, followed by a course of quinine, commencing with 30 grains daily for 3 days and reducing to 20 grains on subsequent days. In all 280 grains of quinine were given between the 28th November and 12th December. Blood films were examined frequently until 13th December and remained negative during that time.

29th December. Slight malaise; temperature 99.8°F. with sickness. Blood showed malignant tertian. Malaria treatment was commenced with atebtrin 0.1 gramme twice daily for seven and a half days along with plasmochin 0.01 gramme twice daily on the 5th, 6th, and 7th days only. Blood was negative on 30th, and remained negative until the 5th January, 1934, when daily examination was discontinued.

9th January, 1934. Slight sickness, no fever. Blood film malignant tertian rings. Treatment—Atebtrin, 3 tablets only on 10th January.

11th January. Blood positive, malignant tertian treatment, 2 tablets atebtrin.

12th January. Blood negative, atebtrin stopped. From the 9th January, treatment was entirely guided by blood findings as it was evident that long and complete courses of atebtrin and plasmochin and of quinine were not effective in limiting the progress of the infection.

Blood films were examined daily and, if positive, one or two doses of atebtrin were given until the blood again became negative.

Blood films were positive on the 31st January, but the parasites disappeared from the peripheral blood after two doses of atebtrin of 0.1 gramme each. Blood films were examined daily until 18th February and

remained negative. The patient left India on home leave at the end of February and up to that time there had been no recurrence of malarial symptoms. She was instructed to limit treatment of any subsequent malarial symptoms to the minimum amount of atebirin which would give complete relief.

The patient's hæmoglobin was found to be 70 per cent (Tallqvist) on the 1st January, 1931, and a course of iron arsenate in ampoules of 1 c.cm. was started. One c.cm. was given daily for 3 weeks by the intramuscular route.

At the conclusion of treatment the hæmoglobin was found to be 85 per cent (Tallqvist).

In addition to the above, the patient was enjoined to rest as much as possible and to avoid fatigue as the fatigue factor contributes very largely to relapses.

The importance of these factors and the use of a suitable hæmatinic are essentials in symptomatic treatment.

Discussion

The first point of interest in this case is the failure of a five days' course of atebirin and plasmochin, exhibited in full curative dosages, to arrest the onset of typical clinical malaria within four days of the completion of treatment.

It is a moot point as to whether blood culture would have revealed the presence of malarial parasites in the peripheral blood as the slow elimination of atebirin might easily have interfered with the success of the culture. In any case, blood culture is merely a finer method of search than is afforded by thick films and is not likely to have shown a positive result in view of the number of thick films examined and the time spent on them.

The second point of interest is the failure of atebirin and plasmochin and of quinine to prevent relapses after very adequate courses. The atebirin course was varied in each different treatment with a view to finding a better mode of exhibition and, in the last course, was given in smaller doses over seven and a half days in order to allow for the establishment of natural immunity in the patient. The final course adopted, of limiting treatment according to blood findings, seemed to be the only reasonable method of attack in this case.

I should like to point out that re-infection can be eliminated in this case from 1st December onwards, as transmission of malaria in this part of Assam is then in abeyance. Gut and gland infections in *Anopheles minimus* which is the vector *par excellence* of malaria in Assam are extremely rare after 1st December. *A. minimus* will not feed when the minimum temperature falls regularly below 60 degrees F. These findings have been repeatedly verified, in the Surma valley by Ramsay (1930), and in the Brahmaputra valley by the writer (1931). The minimum temperatures in Assam fall regularly below 60 degrees F. about 20th to 24th November each year. It has further been established that wild *Anopheles minimus*, which normally feeds readily, will not partake of a blood meal in the laboratory after the fall in night temperatures to 60 degrees F.

The argument might be adduced that the attack of clinical malaria on 5th September should have been treated and that the subsequent relapses might thus have been eliminated. This is unlikely as atebirin must still have been present in the general circulation in considerable amount on that date, as complete excretion takes about two or three weeks. It seems most probable that a further exhibition of atebirin would not have led to cure at that time. The final course of treatment adopted agrees in principle with the method advocated by the Malaria Commission of the League of Nations (1933). Their report on malaria is a model of completeness and clearness.

The use of quinine with atebirin is not advised by the Commission, but, on what precise grounds, is not stated.

The necessity of limiting the infection as soon as a positive diagnosis is made seems to be of primary importance in gastric types of malaria, and the first consideration from the patient's point of view is the cessation of fever. Whilst the establishment of natural immunity is indicated as an essential part in the cure, the patient cannot be left for a few days untreated as suggested in the report of the Commission. In these circumstances, the preliminary use of quinine appears to be eminently indicated. Regarding the final symptomatic method of treatment, so far as my experience goes, I have found it better, in severe relapsing malarias, especially of the malignant type, to avoid excessive medication and to allow the patient to assert his own natural immunity, helped out by the judicious use of suitable drugs which will prevent the appearance of clinical symptoms. Extensive medication in these cases, in my experience, only leads to hæmoglobinuria and even to blackwater fever. In this opinion, I find that most old residents in Assam agree thoroughly. Malaria is a self-limiting disease and this rational mode of treatment commends itself.

It is necessary here to emphasize the need to watch the process of cure with extreme care and to be guided by regular blood findings. The need for rest, the avoidance of fatigue, and the use of suitable hæmatinics must also be stressed. Iron by injection has recently come under the ban that falls periodically on all modes of treatment in all diseases, but I have never found the patient fail to respond to injections of iron arsenate in this type of case.

Summary and conclusions

Atebin and plasmochin in full curative doses failed to prevent the onset of clinical malaria within four days.

Atebin and plasmochin in various doses and combinations failed to prevent relapse in this case. Quinine in large doses also failed to establish a cure.

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NAGA SORE IN A TEA-ESTATE PRACTICE*

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NAGA SORE is a disease that is responsible for the crippling of a large number of tea-garden coolies during the busiest season of the year; though there is no mortality from this disease, unless complicated with some other intercurrent disease, it disables more coolies for a longer time than malaria and hookworm disease taken together. Sometimes it occurs in epidemic form and affects a large percentage of the working coolies so that the work of the garden is seriously hampered.

Season of onset.—It invariably occurs during the monsoon months. Last year it began in the early part of May and attained its maximum in June and July. It began to diminish after the monsoon and has now entirely disappeared in December.

Sex.—Of 69 cases, 41 were men, 25 women, and 3 children; that is to say, both sexes are equally prone to this disease.

Age.—Only 3 cases occurred in children; the rest were among those doing outdoor work. Generally boys and girls above 10 years work in the garden.

Mode of onset.—It was always preceded by some injury, e.g., a cut, an abrasion, a leech-bite, or a thorn-prick, or by scabies. Sometimes the ulcer was formed very rapidly, say within a week, after the primary injury.

The part of the body affected.—It is very selective in its distribution; it was mainly found on the legs below the knees. In my series there was one instance of ulcer on the mamma of a woman and another on the forearm; in the rest it was situated below the knees. This selective distribution of the ulcer suggests soil infection.

Signs and symptoms.—At first there is nothing but a simple abrasion, in about a week or so

this assumes its characteristic appearance. It presents a punched-out appearance, and may be circular, or irregular; the shape of the ulcer depends upon the nature of the primary injury received. The edges are undermined, and the margins are raised, indurated and hard to the touch. Sometimes the ulcer gives a 'mouse-eaten' appearance. The ulcer is always covered with a thick grayish-yellow foul-smelling slough with a sero-sanguineous discharge. Sometimes it bleeds on slight touch or on gentle walking. I noticed in a girl an ulcer commencing to bleed whilst she was standing still. It may be very painful at the start, but later on little pain is felt. Lymphangitis is not always present. In some of my cases the affected part presented the appearance of elephantiasis; in one the ulcer completely healed up, but on account of the interference with the venous and lymphatic return his leg was still swollen and oedematous and the condition might have been mistaken for elephantiasis; this may have been due to involvement of the superficial lymphatics in the scar tissue or to obliterative changes in the vessels following septic absorption from the ulcers. The surrounding skin of the ulcer is normally healthy, and little or no constitutional disturbance is present. In some of the cases there was fever for a few days, but this may have been of malarial origin; otherwise the disease is afebrile throughout its whole course.

The ulcer appears to be self-limiting and will eventually heal even when left untreated. One patient refused to have any treatment from the dispensary; I observed him closely and found that he was little the worse for not receiving our treatment; he cured the ulcer in four weeks by applying some 'home medicine'. One cannot be certain whether it was Nature's cure or whether the particular drug healed up the ulcer.

There were no complications in my cases.

Is the ulcer contagious?

Roy (1928) considers that the disease is not contagious. In my series, four of the patients lived in one house, and another two were mother and daughter. On this evidence alone one cannot say whether or not the disease has a tendency to occur amongst members of the same family, but the observation is suggestive.

The problem of immunity.—One attack of Naga sore does not produce any immunity in the victim. One patient had a second ulcer only a few days after his first ulcer was healed up, and another had a second ulcer before his first one was completely cured. However, during this year, about 20 per cent of the newly-recruited coolies were affected, and only about 2 per cent of the old coolies, that is to say, of the 69 cases, 50 were in the former class and 19 in the latter.

Most of the workers in tea districts favour the idea that contamination with soil plays an important part in the causation of the Naga sore. Now the point is, whether long residence

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The use of symptomatic treatment, based on blood findings, is advocated in cases of relapsing malaria.

Symptomatic treatment must be combined with adequate rest, avoidance of fatigue, and the use of suitable hæmatinics.

REFERENCES

Malaria Commission, League of Nations (1933). Therapeutics of Malaria, Third General Report of the Malaria Commission. *Quart. Bull. Health Organization, League of Nations*, Vol. II, No. 2, p. 185.

Manson, D. (1931). Some Observations on a Malaria Survey carried out in the Jorhat District of Assam. *Journ. Trop. Med. and Hyg.*, Vol. XXXIV, p. 149.

Ramsay, G. C. (1930). Some Findings and Observations in an Anopheline Malaria Infectivity Survey carried out in the Cachar District of Assam. *Indian Journ. Med. Res.*, Vol. XVIII, p. 533.

in a place does confer some sort of immunity upon the people against a particular soil, surcharged with the causative organisms of Naga sore. Another thing to note is that many of the temporary coolies who generally come for work during the rains and go away after some days suffer from similar ulcers. I have omitted them from the report as it was not possible to keep them under observation for any length of time; they generally shift from garden to garden.

Economic loss.—On an average each coolie was disabled from any outdoor work for about 38.14 days. The newly-recruited coolies suffered on an average about 41.04 days, and old coolies about 30.52 days, so the duration of disease was greater in the former than in the latter.

The busiest portion of the year in tea gardens is from June to August and during this period there is shortage of labour in many gardens. Hence the loss of 66 working coolies for a period of 38.14 days is a serious problem, and research on these lines is urgently needed.

Treatment.—Every medical man with a little tea-garden experience knows quite well how difficult and tedious it is to treat these ulcer cases.

Most of the antiseptics in the British Pharmacopœia have been tried without much benefit. 'E.C.' has been much advocated by some Assam workers; in my opinion it is a good drug for subsidiary treatment, but at the start it is not of much use. I have found the following lines of treatment successful:—

(1) As soon as the patient comes under observation with a fully-developed Naga sore, cauterize it thoroughly with pure carbolic acid, until the sloughs separate and the underlying raw surface comes into view. One application may not suffice; sometimes two or three applications will be necessary. Carbolic acid is the only drug that can be relied upon to remove the sloughs. If during the course of treatment sloughs again appear, the ulcer should be again cauterized. It may be thought that these repeated applications will cause poisoning, but I have treated hundreds of cases of Naga sore in this way and have never met with any accident.

(2) After the sloughs have separated, dress the ulcer with any antiseptic dressings you prefer. It may be mentioned here that unless and until the sloughs have separated it is of no use to apply any lotion or antiseptics.

(3) I have tried the following dressings as subsidiary treatment to cauterization with carbolic acid, but I am not in a position to say which is the best because the duration of treatment was almost the same in each case, and unless the patients are detained in hospital and kept under close observation it is not possible to study the merits and demerits of a particular line of treatment:

(a) Washing and dressing with 'E.C.' lotion.

(b) Washing with potassium permanganate lotion, and dressing with plain sterilized gauze.

(c) After washing with these lotions, dusting boro-iodoform over the ulcer and dressing.

(d) Washing and dressing with normal saline.

(e) Dressing with potassium permanganate ointment (1 to 2 per cent).

(f) Dressing with carbolized oil.

(4) As soon as granulation has formed the ulcer should be dressed with some ointment (boric or zinc) or iodox; the latter is better, but it is too expensive for general use.

(5) Iron and arsenic tonic to improve the general condition of the patient.

Throughout the whole course of treatment all patients should be strictly forbidden to do any outdoor work, because it has often been found that contamination of the ulcer with soil when it is almost healed up, results in the recrudescence of the condition, but they may be given light work inside the factory house without any harm.

Some preventive measures

(1) Early treatment of minor injuries such as scratches, thorn-pricks, leech-bites, etc., received during outdoor work. Theoretically, this is a good procedure, but it is very difficult to bring into practice. Coolies will never come up to the dispensary to have their minor injuries dressed. They are sometimes found working in the garden with fully-developed Naga sores on their legs, but if adequate sick allowances are given to those suffering from such ulcers and provision is also made for the families of the sufferers they may be tempted to come to the dispensary or hospital. Companies may have to incur a heavy initial expenditure, but ultimately they will be no losers as they will have increased work during the rains, for duration of treatment will be much shorter if the cases are detected early.

(2) The wearing of putties; this has met with opposition from the coolies specially from female coolies.

(3) Compulsory washing of the legs in some antiseptic lotion (phenyl or potassium permanganate) when they come back from garden work. Two tanks (pucca) one foot deep should be constructed on both sides of the weighing house where all coolies have to assemble twice daily for having their leaves weighed; in these tanks phenyl lotion should be prepared once daily in the morning. Water taps should be fitted in these tanks with outlets, and the tanks so arranged that each coolie will have to walk through this lotion in order to reach the weighing house. In this way all coolies will be compelled to wash their legs four times a day while crossing these lotion tanks. Separate arrangements should be made for entrance into and exit from the weighing house. The size of the tanks

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THE INCIDENCE OF CLONORCHIIS INFECTION IN INDIA*

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THE literature on the incidence of flukes in India is both meagre and conflicting. The only systematic investigation that has been made in connection with helminthic infections is by Chandler (1928) who states in his detailed

* Read at the Indian Science Congress, Bombay, 1934.

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will depend upon the number of coolies working in the garden concerned.

In addition potassium permanganate may be distributed in small packets to all the working coolies for washing their legs at their homes when they come back from work. This compulsory washing of the legs daily will help to treat early any minor injuries received in the garden.

I take this opportunity of expressing my sense of gratitude to Mr. R. P. Moznunder, the present manager of Ambari Tea Estate, for kindly giving me every facility for treating these cases.

REFERENCE

Roy, D. N. (1928). *Indian Med. Gaz.*, Vol. LXIII, p. 673.

[Note.—In the interests of economy of space we have been compelled to omit the author's table of cases treated; the points not already brought out in the paper we have summarized below:—

DATES OF ONSET

Month	Cases
May	4
June	37
July	22
August	2
September	4

AGE AND SEX INCIDENCE

	Male	Female
Under 10 years ..	1	15
10 years, under 20 ..	7	5
20 " " 30 ..	21	4
30 " " 40 ..	5	1
40 " " 50 ..	8	
	42	27

EDITOR, I. M. G.]

survey of the subject that there are no endemic cases of clonorchis or opisthorchis infection anywhere in India or Burma, although they are very common in China and Indo-China. Manson-Bahr, on the other hand, while dealing with the subject of clonorchiasis in his book, refers to Leger who is said to have found 'the eggs in 50 per cent of the natives of the East Coast of India', but Chandler did not find even a single case of clonorchis infection in any of the provinces, although his investigation covered practically the whole of India including the east coast. Only a few sporadic cases of fluke infections other than clonorchis were found in practically every province except Burma. *Fasciolopsis buski* is the one which was commonly met with and it was found almost in endemic form in some parts of Assam. McConnell (Castellani and Chalmers, 1919) reported two cases of opisthorchis infection among Indians in Calcutta and one of clonorchis in a Chinese who apparently got the infection in China, and hence this was not an indigenous infection. Knowles (1923) reported a case of clonorchis infection in Assam, but Chandler believes that it was really a case of opisthorchis which is a very common parasite in cats and dogs in Calcutta and also in other parts of India, especially in eastern India. Besides, the clinical history of the case, as given by Knowles, is against the possibility of any such infection. Byam and Archibald mention that Acton found two cases of clonorchiasis in Mesopotamia among Indian soldiers. On referring to the paper it is seen that Acton (1919) found ova of *Clonorchis endemicus* in two and ova of *Heterophyes heterophyes* in one out of about 3,000 Indian soldiers. As there is no reference in the paper to the condition of the patients in whose faeces the ova were found, it may be assumed that the clinical features of these cases were not in any way suggestive of clonorchiasis, otherwise they would have attracted the attention of a keen observer like Acton and found place in his paper. The eggs found in the stools were probably opisthorchis eggs.

As clonorchis is very common in China, Japan and other Far Eastern countries, there is a likelihood of cases occurring in Burma but Chandler failed to detect any. Manson in describing the geographical distribution of the liver flukes has mentioned India as one of the countries where it is found, but no genuine indigenous case, confirmed either by finding the flukes or by clinical features, has so far been reported.

In Bihar, only two cases of *Fasciolopsis buski* infection were found by Chandler in the districts of Singhbhum and Ranchi and by other observers in Monghyr and Patna. The case I am reporting here appears to be one of *Clonorchis sinensis* infection and was found in Patna. The patient, a Muhammadan male, aged 23 years, consulted his doctor for treatment of anaemia, enlarged spleen and liver and occasional attacks

of fever of irregular and intermittent type—sometimes with only a slight rise of temperature in the evenings. There was a history of geophagy (earth-eating) when he was a boy of fourteen. He was of stunted growth, appeared to have undergone no development during the last nine years of his illness, and looked like a boy of thirteen with all the features of infantilism. There was an irregularity of the bowels—diarrhoea alternating with constipation—and also a history of a mild attack of jaundice a few months ago. He was suspected to have been suffering from kala-azar or malaria with ancylostomiasis as a complication. The examination of his blood and the following blood picture completely negated the possibility of malaria or kala-azar :

Red blood cells	..	..	3.37 millions
White blood cells	..	..	10,800
Polymorphonuclears	..	..	66 per cent
Lymphocytes	..	..	18 " "
Large mononuclears	..	..	4 " "
Eosinophiles	..	..	12 " "
Abnormal corpuscles (microcytes and poikilocytes)	..	..	present
Hæmoglobin	..	..	45 per cent
Colour index	..	..	0.67

No malarial parasites were found and the serum tests for kala-azar were all negative. The urine was normal. The examination of his faeces did not show any ova of hookworms even after the most exacting search by Lane's method for four days. But on the other hand, the first examination of the faeces showed an ovum of brown colour with characteristic operculum and shape. As more were expected, it was not measured and was thrown away and repeated examination of the same stool did not show any more ova. Another sample of faeces was obtained after two days and a thorough search was made for these ova but nothing was found. The third sample on the next day was also negative. The fourth examination after a couple of days more showed three ova in two slides. They were carefully measured and all of them were found to be of about the same size with slight difference in length only. The average dimensions were 27.6 by 15.9 μ , or 28 by 16 μ in round figures.

The colour, shape and size of these ova are quite characteristic of *Clonorchis sinensis*, but it may be noted here that the ova of clonorchis, opisthorchis and heterophyes look very much alike and they cannot always be differentiated under the microscope; the specific diagnosis can only be made satisfactorily by examination of the flukes themselves. In this case no parasites could be detected in any of the samples of faeces, and I was obliged to fall back on the microscopic examination of the ova in all their details and to compare them with typical clonorchis ova, which I had had

with me in a permanent preparation made by me a few months ago in the Liverpool School of Tropical Medicine from an authentic specimen of *Clonorchis sinensis* infection; I found that these specimens resembled each other in minute details. Under these circumstances I did not feel any hesitation in saying that these ova were really the ova of *Clonorchis sinensis*.

The classification of the genus *Clonorchis* into *C. sinensis* and *C. endemicus* is not based on reasonable grounds. They cannot be distinguished and are morphologically identical. The pathogenicity of clonorchis or the intensity of the signs and symptoms depends upon the number of the parasites invading the hosts and not on any morphological features. The question of making any distinction between the two on grounds of pathogenesis is not reasonable, and has not been accepted by Manson.

Apart from the characteristic features of these ova the pathogenicity of this fluke is also a determining factor in establishing its identity. *Opisthorchis* is found as a parasite of cats and dogs in India and other places, but has not been known to produce any disease. *Heterophyes* has so far not been found in India (excepting one found by Aeton in Indian soldiers in Mesopotamia, as already stated), and is not pathogenic. *Clonorchis* is undoubtedly a pathogenic parasite and has not yet been detected in animals in India. The description of the signs and symptoms of clonorchiasis, as given by Manson, corresponds with this case to a remarkable extent, but the patient did not at the time of investigation develop any anasarca, ascites, or intractable diarrhoea, which are generally found in very advanced cases that end fatally. The signs and symptoms of this case indicate an infection of moderate intensity and the treatment given to him so far seemed to have retarded the onset of further complications for the time being. The chronicity of these cases is one of their special features and even the worst cases drag on for several years before they die. In the absence of other causes, the anaemia, the physical signs and the blood picture of the patient could also be explained by ancylostomiasis, but when four examinations of faeces during the course of a week did not show a single hookworm egg, even by the most reliable method of examination, the possibility of hookworm infection can safely be excluded.

Considering the life history of the flukes, the source of infection of these sporadic cases of clonorchiasis in this country is rather mysterious, for the people of India seldom take uncooked fish. It has been proved in China that certain water plants in which the cercariae encyst are also responsible for the spread of flukes in man and Chandler traced the infection of *F. buski* in Eastern Bengal to the eating of 'panifal' or 'singara' (*Trapa bicornis*) which is 'taken raw and commonly peeled by the teeth'. It is therefore quite possible that

'singara' plays also the same part in infecting men with clonorchis.

Summary

The flukes that infect men are very rarely found in India. Chandler reported a few sporadic cases of *F. buski* infection in different provinces, but he did not find a single case of clonorchiasis anywhere in India or Burma, although it is very common in China, Japan, Korea and other Far Eastern countries.

McConnell found clonorchis in a Chinese in Calcutta. Knowles reported the finding of the eggs of clonorchis in the faeces of a man in Assam, and Aeton in two patients among the Indian soldiers in Mesopotamia, but no specific diagnosis was made, either by finding the flukes or by clinical history. The case referred to in this paper is an indigenous one developing signs and symptoms suggestive of clonorchiasis, and typical ova were found in his faeces.

The ova of clonorchis, heterophyes and opisthorchis all look alike and it is very difficult to differentiate them under the microscope.

In China, Japan and other eastern countries the practice of taking uncooked fish spreads infection in man. Certain water plants in China have also been found to harbour encysted cercariae. Chandler traced infection of *F. buski* to eating the common waternuts or 'singara' (*Trapa bicornis*) in Eastern Bengal. It is probable that this waternut which is found all over India may be the source of infection in the sporadic cases of clonorchis and other fluke infections.

REFERENCES

- Aeton, H. W. (1919). *Indian Journ. Med. Res.*, Vol. VI, p. 601.
- Byam, W., and Archibald, R. G. (1923). *The Practice of Medicine in the Tropics*. Vol. III. Henry Frowde, and Hodder and Stoughton, London.
- Castellani, A., and Chalmers, A. J. (1919). *Manual of Tropical Medicine*, p. 577. Third Edition. Baillière, Tindall and Cox, London.
- Chandler, A. C. (1926). *Indian Journ. Med. Res.*, Vol. XIV, p. 179.
- Chandler, A. C. (1926). *Ibid.*, Vol. XIV, p. 481.
- Chandler, A. C. (1927). *Ibid.*, Vol. XIV, p. 733.
- Chandler, A. C. (1928). *Ibid.*, Vol. XV, p. 695.
- Knowles, R., Chopra, R. N., Gupta, J. C., and Das Gupta, B. M. (1923). *Indian Med. Gaz.*, Vol. LVIII, p. 470.
- Manson-Bahr, P. H. (1929). *Tropical Diseases*. Cassell and Company, Ltd., London.

[Note.—The evidence that this is a case of clonorchis infection is not at all conclusive as it appears to have been based on the study of three eggs. Up to the present no case of endemic infection with this fluke has been definitely proved in India. The suggestion that sporadic infections of clonorchis may be transmitted, like *Fasciolopsis buski*, by cercariae encysted on the corm of *Trapa bicornis* is not in accord with the known life history of this parasite, as a second intermediate host (a fish), in which the cercariae encyst, is needed.—
Editor, I. M. G.]

FURTHER OBSERVATIONS ON THE METABOLISM OF CAROTENE

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It is now well established that carotene is a precursor of vitamin A, and its transformation into the vitamin is a function of the animal organism. During studies of the mechanism of this change, attention has been focused mainly on the liver, the storehouse of vitamin A in the animal body, and at least one investigator has claimed that the change takes place in the liver through the action of a hepatic enzyme (Oleott and McCann, 1931). But this claim has not been generally substantiated. On the other hand attempts to convert carotene into vitamin A with the help of liver tissue or liver extracts under different conditions have failed, and even the direct perfusion of the intact liver with suitable carotene solutions has not met with any degree of success (Ahmad, 1931; Rea and Drummond, 1932). The more recent observations, however, show that the change of carotene into vitamin A in the animal body may be a slow process, for the formation of vitamin A is not detected until 8 days after the introduction of carotene (Drummond and MacWalter, 1933).

In this study attempts have been made to follow the fate of carotene after its introduction into the venous circulation of an animal. Four different species of animals were used. They were kept on a vitamin-A-free diet for a preliminary period of varying duration depending upon the species of the animal. In rats the depletion of vitamin A can be judged from the fall in weight and the development of the typical eye condition. This is not possible in other animals. Therefore, in the case of animals other than rats, a piece of the liver was aseptically removed by a surgical operation to serve as control for the vitamin-A reserves still left in the body. A few days were allowed to the animal to recover from the effects of the operation. Then a colloidal solution of carotene in 2 per cent glucose was administered for a certain period as a course of intravenous or intraperitoneal injections. After the completion of the carotene administration the animal was killed and its liver and other tissues were examined both for carotene and vitamin A.

The results are summarized in tables I and II.

The rat which can readily assimilate carotene, and conserve large stores of vitamin A in the liver, derived from the pigment fed orally in an oil medium, failed to do so under the condition of these experiments. The administration of a relatively large amount of the pigment did not

TABLE I
(Summary of the result of rat experiments)

No.	Mode and amount of carotene administered	Name of tissue	Weight of tissue, g.	Weight of fat, g.	Total yellow units	Total blue units	REMARKS
2	0.25 c.cm. of colloidal solution containing 0.05 mg. carotene injected into a tail vein daily; 6 injections in 6 days.	liver	0	Both eyes affected; no improvement on the administration of carotene; later, one eye lost; immediate response on oral administration of carotene in olive oil.
4	Total: 0.3 mg. carotene. Do.	liver	0	On the injection of carotene condition became steadily bad, though weight remained almost constant; evidence of a toxic effect; died on the 7th day.
5	0.25 c.cm. colloidal solution daily, containing 0.05 mg. carotene into one of the tail veins; 9 injections in nine days.	liver	0	On the administration of carotene condition became bad; developed diarrhoea; died on the 21st day after the first injection.
	Total: 0.45 mg. carotene.						
15	0.25 c.cm. colloidal solution containing 0.05 mg. carotene into one of the tail veins on alternate days. 10 injections in 20 days.	liver	7.15	0.130	7.0	0	The carotene injections did not affect the general state of health; weight remained steady, eyes unaffected; killed five days after the last injection, and no vitamin A in the liver.
	Total: 0.5 mg. carotene. Do.	kidneys	0.295	0.038	0.5	0	
		tail	..	0.05	4.5	0	
16		liver	4.47	0.141	6.0	0	Do.
		kidneys	0.52	0.04	0.5	0	
		tail	..	0.55	7.5	0	
		liver	..	..	..	0
11	9 injections of 0.25 c.cm. solution daily containing 0.05 mg. carotene each for 9 days, intraperitoneally.						Weight rose slightly on the administration of carotene; general condition remained unchanged; killed five days after the last injection. No vitamin A detected in the liver post-mortem.
	Total: 0.45 mg. carotene.						
17	Ten injections of 0.25 c.cm. solution containing 0.05 mg. carotene each, on alternate days in a period of 20 days, intraperitoneally.	liver	5.54	0.114	6.5	0	On carotene injection weight slightly rose; general condition unaffected; killed five days after the last injection. No vitamin A detected in the liver. (Kidneys were enlarged and appeared to be congested).
	Total: 0.5 mg.	kidneys	0.62	0.042	0.9	0	
		spleen	0.56				
		intestines	0.28	0.035	1.6	0	
		omentum	..	0.040	trace	0	
			..	0.051	4.0	0	
18	Do.	liver	4.6	0.102	6.5	0	Do.
		kidneys	0.42	0.35	0.7	0	
			0.41				
		spleen	0.21	0.042	1.0	0	
		intestines	..	0.041	trace	0	
		omentum	..	0.034	3.7	0	

Intravenous injections were given in one of the veins of the tail. In two animals (nos. 15 and 16) post-mortem examination of the tails was made. Subcutaneous yellow deposits of carotene were noticed at some places. These were presumably spots where the carotene solution had been injected during trials before the needle actually got into the vein. The ether extract of the tail was yellow but the fatty residue showed no blue colour on the addition of antimony trichloride reagent.

Animals nos. 17 and 18 also showed one or two patches of the subcutaneous deposit of carotene formed similarly as in the tails of rats nos. 15 and 16. No such deposit of carotene could be detected in the peritoneum. Omentum was distinctly yellow but showed no blue colour reaction.

Colloidal solutions of carotene were prepared fresh each time for the injection.

result in the formation of any detectable quantity of the vitamin, and even failed to relieve the eye condition or loss in weight arising from

the deficiency of vitamin A. Indeed in some cases the injections of carotene appeared to have a toxic effect upon the animals, though such

TABLE II
(Summary of the results of experiments on other animals)

No.	Mode and amount of carotene administered	Name of tissue	Weight of tissue, g.	Weight of fat, g.	Total yellow units	Total blue units	Total blue units per gramme of liver tissue	REMARKS
Dog 2	20 c.cm. colloidal solution containing 1.6 mg. carotene was injected into the femoral vein, 11 injections were given in 14 days. Total: 17.6 mg.	liver before injection.	231.0	5.61	297	199,650	864.2	The injections were started one week after the operation; weight increased from 9.0 kg. (before operation) to 10.5 kg. (last day of injection). General health good. Killed three days after the last injection. No vitamin A formed in the liver.
		liver after injection.	231.0	1.65	701	136,125	589.2	
		blood (part)	70.0	..	0	0	0	
		heart	82.5	..	0	0	0	
		adrenals	1.95	..	0	0	0	
		spleen	26.0	0.381	181	11,473	441.2	
		pancreas	17.0	..	0	0	0	
		duodenum (part).	22.6	..	0	0	0	
		caecum (part).	16.2	..	0	0	0	
		caecal contents (part).	12.5	..	trace	0	0	
		kidneys	53.6	..	0	0	0	
		urine	..	..	0	0	0
Goat 1		liver before operation.	540.0	9.001	596	5,834	10.8	
		liver post-mortem.	540.0	..	..	..	..
	Do.							Initial period of vitamin-A-free diet consisting of dried wheat and barley, 32 weeks (7½ months). Died next day after the operation; death due to ileus and not hæmorrhage from the liver. Post-mortem appearance of the various tissues was normal. The sections showed no keratinization of the epithelium anywhere.
Rabbit 9	5 c.cm. solution containing 0.5 mg. carotene was injected into the ear vein. Ten injections were given during a period of 21 days, one each alternate day. Total: 5.0 mg. carotene.	liver before injection.	16.81	1.04	trace	0	0	The animal was on a vitamin-A-free diet consisting of dried wheat and barley for an initial period of 19 weeks. Weight was nearly steady during the last few weeks and appeared to be depleted of the body stores of vitamin A which is confirmed by the examination of the control liver. There is an evidence of the formation of vitamin A in the liver from the administered carotene.
		liver after injection.	16.81	0.273	100	330	19.5	
		kidneys	5.02	0.14	5	0	0	
		spleen	0.265	0.017	10	0	0	
		small intestine.	10.5	0.023	0	0	0	
		large intestine.	23.7	0.016	0	0	0	

effects were not noticed on other animals in a relatively better state of health. Further, no evidence of the change of carotene into vitamin A could be obtained when similar injections were given into the femoral vein of a dog. Only in the case of the rabbit did it appear that vitamin A found in the liver was derived from the administered carotene.

The question arises as to how this large quantity of the pigment so introduced into the circulation is disposed of by the organism. It cannot be detected in the blood, nor is it excreted in the urine, unless it is completely changed into

products with different physical and chemical properties. The liver and the spleen are the organs which show an increase in their yellow unit content after carotene administration.

It was previously suggested that on account of their other similar activities the reticulo-endothelial cells may be concerned in this process (Ahmad and Malik, 1933). It now appears that such a view is not improbable. The reticulo-endothelial cells, on account of their capacity of phagocytosis and intracellular digestion, probably constitute the normal mechanism of the body for dealing with any foreign colloidal

matter, animate or inanimate, that gains access into the circulation. After the injection of carotene the pigment appears to be chiefly localized in the liver and the spleen (table II)—organs which are the chief storehouse of the reticulo-endothelial cells. More indirect evidence also seems to indicate similar conclusions. The evidence of the formation of vitamin A after the injections of colloidal carotene into the circulation has only been obtained in the rabbit, while it failed in other species of animals under similar conditions. Of all the experimental animals the reticulo-endothelial system of the rabbit is regarded to be functionally more powerful, as it responds more quickly in immunization experiments. The rôle of certain cells (histiocytes) of the reticulo-endothelial system in the phagocytosis and ingestion of red-blood cells and the formation of bilirubin is familiar and not unanalogous (McNee, 1923). Several investigators have indicated a possible relationship between the reticulo-endothelial cells (monocytes) and antibody formation which furnishes further analogy (Pfeiffer and Marx, 1898; Hektoen and Carlson, 1910; Leukhardt and Becht, 1911; Topley, 1930; Napier, Krishnan and Lal, 1933). Finally it may be pointed out that, with the exception of the spleen, there is some parallelism in the concentration of vitamin A and the reticulo-endothelial cells in the animal body, though possibly the formation and storage of vitamin A may be a function of the different types of reticulo-endothelial cells.

All this evidence is perhaps not more than suggestive. The confirmation of this view could only be made after the method and technique of demonstrating the presence of both carotene and vitamin A within the individual cells is developed.

In the end we wish to thank Professor S. S. Bhatnagar and Lieutenant-Colonel D. H. Rai for allowing us the facilities of their laboratories for this work. Our thanks are also due to Pandit Vishwa Nath for the post-mortem examination of the goat.

REFERENCES

- Ahmad, B. (1931). *Biochem. Journ.*, Vol. XXV, p. 1195.
 Ahmad, B., and Malik, K. S. (1933). *Proc. Brit. Med. Assoc., Punjab Branch*, 18th January.
 Drummond, J. C., and MacWalter, R. J. (1933). *Biochem. Journ.*, Vol. XXVII, p. 1342.
 Hektoen, L., and Carlson, A. J. (1910). *Journ. Infect. Dis.*, Vol. VII, p. 319.
 Krishnan, K. V., Lal, C., and Napier, L. E. (1933). *Indian Med. Gaz.*, Vol. LXVIII, p. 66.
 Leukhardt, A. B., and Becht, F. C. (1911). *Amer. Journ. Physiol.*, Vol. XXVIII, pp. 257 and 274.
 McNee, J. W. (1923). *Quart. Journ. Med.*, Vol. XVI, p. 390.
 Napier, L. E., Krishnan, K. V., and Lal, C. (1933). *Indian Med. Gaz.*, Vol. LXVIII, p. 75.
 Oleott, H. S., and McCann, D. C. (1931). *Journ. Biol. Chem.*, Vol. XCIV, p. 185.
 Pfeiffer, R., and Marx (1898). *Zeitschr. Hyg. u. Infektionskr.*, Vol. XXVII, p. 272.

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PREVENTION OF CHOLERA IN RURAL INDIA

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It is a well-known fact that drinking water plays an important rôle in the spread of cholera. By the introduction of the municipal water supplies, cholera has ceased to be of such serious importance in the towns of India as it used to be previously. At the present time cholera is a problem of the villages.

Our present methods of dealing with cholera are of the *suppressive* rather than *preventive* type. Any organization for the control of the disease is put into action after an epidemic of cholera has already started; this can never be successful.

On the other hand if we can ensure the safety of drinking water in the villages, this will be a real preventive measure which will go a long way towards eradicating the disease.

In the majority of the cholera provinces of India the chief sources of water supply are ground wells, and they are also the chief sources of the epidemics of cholera. It is impossible to do away with these wells and the tube-well has been a failure. The safeguarding of these wells will be a real preventive measure against cholera. Besides, pure drinking water is a rare commodity in the villages. The constant use of polluted water may or may not injure the vitality of the villagers in the long run, but it is imperative to protect such water from becoming a veritable source of disease and death.

The device described below is meant to protect the village well from contamination; these details are published in the hope that its adoption may lead to the prevention of the spread of this disease.

Any device for protection of the village well must fulfil the following essential requirements:—

- (a) It must be cheap, that is, within the resources of the villagers;
- (b) it must be simple; every village carpenter should be able to make it or repair it from material available in the village; and
- (c) it must be effective in protecting the well from pollution; if bathing or washing is done near it, polluted material in bulk or in the form of droplets should have no chance in getting into the well.

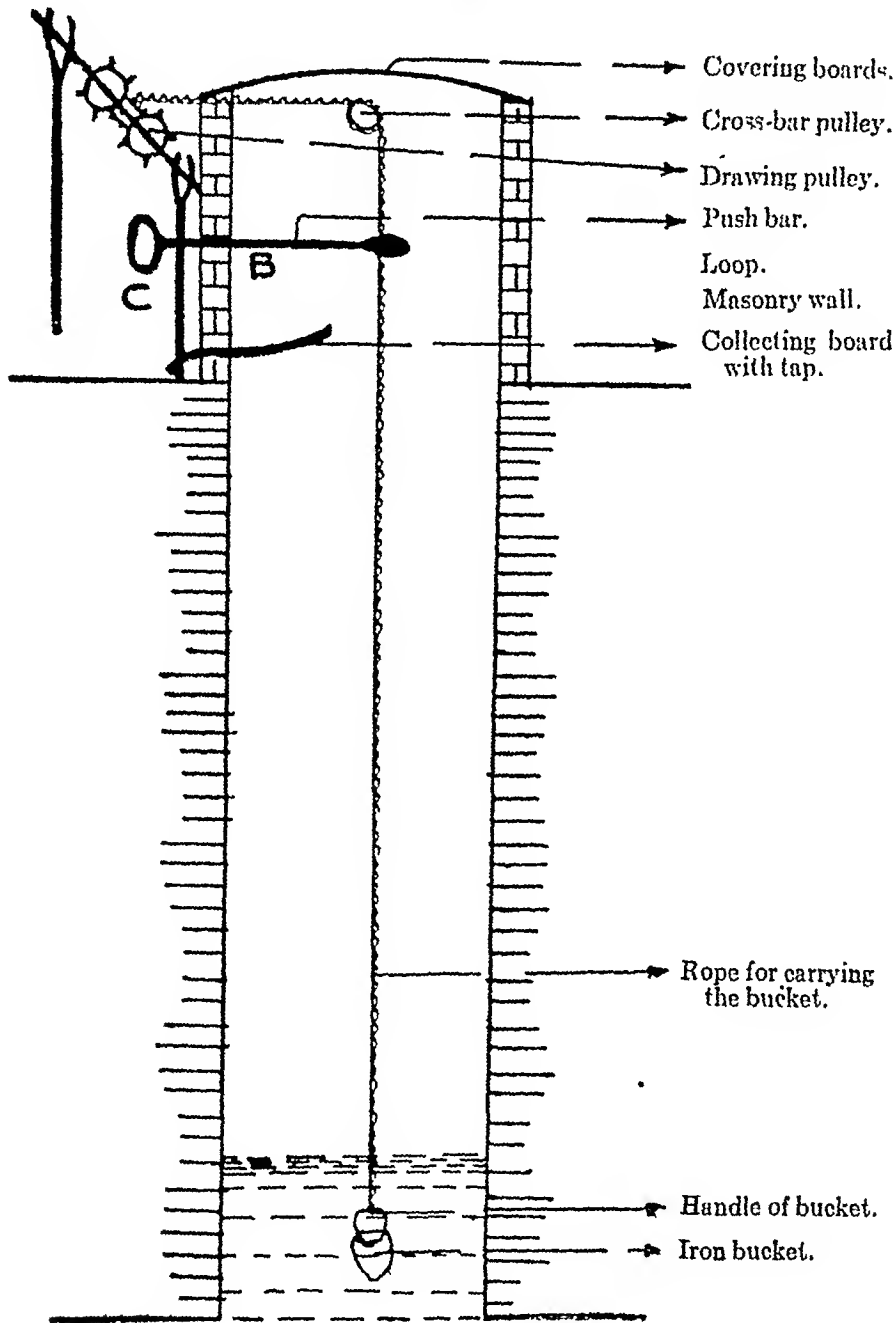
(Continued from previous column)

- Rea, J. L., and Drummond, J. C. (1932). *Zeitschr. Vitaminforsch.*, Vol. I, p. 177.
 Topley, W. W. C. (1930). *Journ. Path. and Bact.*, Vol. XXXIII, p. 339.

Nobody should be able to lower his own bucket, but everybody should be able to draw water when required. The well must be completely covered at the top in such a way as to be easily uncovered at any time whenever it is necessary to clean the well or repair the apparatus, and the covering easily placed again

2. *Collecting board with tap.*—It should be in the shape of a boat and may be made by joining several wooden boards of convenient size. The water from the bucket is discharged on to this board from where it runs out through a tap. The size and shape of the board are designed to serve the purposes of (a) collecting

Fig. 1.



when the cleaning is finished. The well must be capable of being used in the ordinary way whenever so desired.

Below is given a description of a contrivance that fulfils these requirements and the manner in which it should be constructed. The following materials are required (see figure 1):—

1. *Iron bucket.*—The size should be convenient. It must be oval in shape and the bottom pointed, such as is usually used in villages. The pointed bottom ensures its falling on its side and discharging its contents of water.

water towards the tap; and (b) allowing the bucket to fall freely on its side.

3. *A rope of sufficient length for carrying the bucket.*

4. *The drawing pulley.*—This is supported on two wooden poles. It is turned by hand. The rope winds round it. It is used for pulling up and lowering the bucket.

5. *The push bar.*—This is a bar (made of wood or iron) with a loop at one end through which the rope passes. By means of this bar the bucket is pulled on to the collecting board

for discharging the water and pushed off the board again for lowering into the well.

6. *The cross-bar pulley.*—A narrow pulley working on a cross bar over which the rope passes. By this pulley the bucket is kept clear of the collecting board.

7. *The covering boards.*—They completely cover the well and a chain and hook are provided for locking them. The boards should be removable when required.

A masonry wall of backed bricks about five feet in height and one foot in thickness is built around the mouth of the well which is on the ground level. (The height and thickness may be varied considerably according to the requirements). The diameter enclosed by the wall is the same as that of the well (see figure 1).

8. *The delivery tap.*—This may be made of iron; it projects from the outer surface of the wall for a few inches and is about one and a half feet from the ground level. This tap goes through the thickness of the wall and delivers water from the collecting board which is on the inner side of the wall. The lumen of the tap is about one inch in diameter.

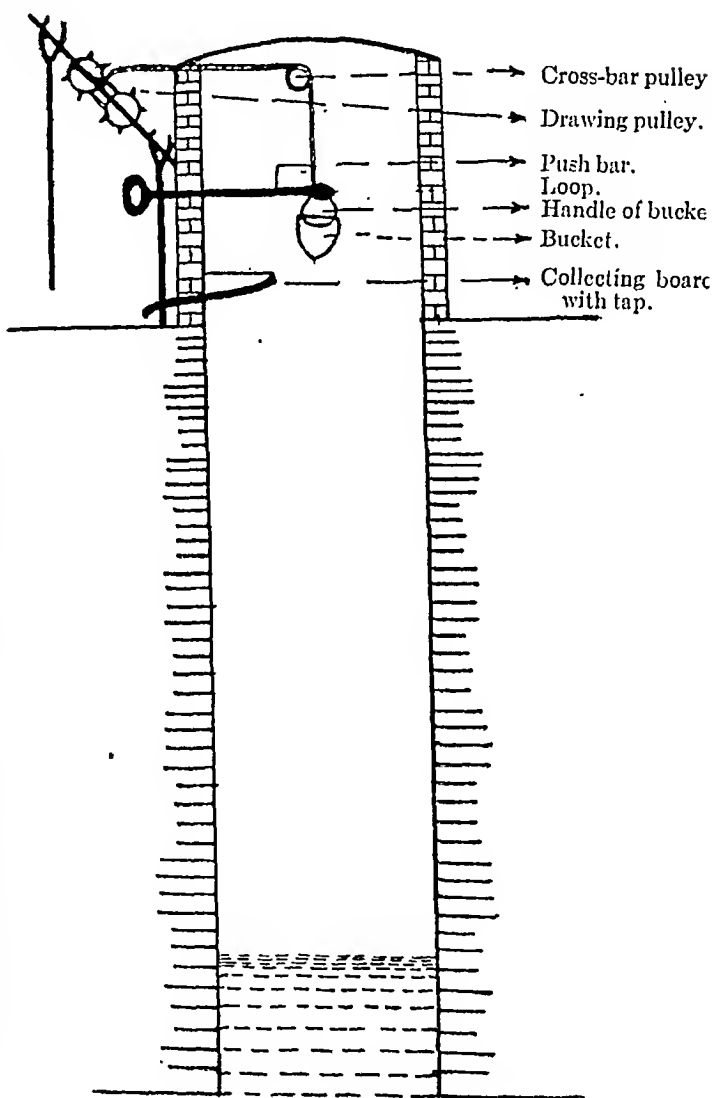
9. *The collecting board.*—This projects into the lumen of the well at the level of the delivery tap. It must slope slightly towards the delivery tap from all sides. The size of the board is according to the circumference of the well. One side is firmly fixed into the wall and the other side which projects into the lumen of the well is fixed firmly to a cross bar. This is to give strength, and the whole board should be strong enough to stand the constant play of the bucket on it. The board must not leak. It may be made by joining several boards as is done in making a boat.

The push bar passes through a hole in the wall on the same side as the delivery tap at a suitable height to be easily worked by the right hand while the left hand is on the drawing pulley. Also it must be sufficiently above the collecting board to keep the bucket free from the collecting board. One end of the push bar has a loop or hole at the end, through which the rope passes freely. The push bar must play freely in the hole in the wall. The ends of the hole in the wall may be strengthened by building wooden blocks (B) into the masonry. It must be of sufficient length to keep the bucket clear of the collecting board and must not produce any kinking of the rope. The outer end of the bar must be shaped in the form of a handle (C) of sufficient thickness to prevent it falling into the well.

As the bucket is pulled up and has reached above the level of the collecting board, the handle of the bucket engages in the loop of the push bar (see figure 2). At this moment the push bar is pulled by the handle for a convenient distance, and at the same time a slight movement of the drawing pulley in the reverse direction, as in lowering the bucket,

allows the bucket to be drawn on to the upper surface of the collecting board (see figure 3). The bucket is released there by a further movement of the drawing pulley. As the bottom of the bucket is pointed, it falls on its side, and if the collecting board is so made as to allow this to occur without impediment, the bucket is almost completely emptied, and the water runs out of the delivery tap. After the bucket is emptied, it is lifted up by a slight turn of the

Fig. 2.



drawing pulley in the right direction (*viz.*, in the direction of drawing up the bucket) and pushed out by the push bar clear of the collecting board. It may then be lowered into the well again.

The cross bar pulley (see figure 4) plays on a cross bar of sufficient length and thickness. The cross bar is placed on the top of the wall. It is placed across the wall at such a distance as to keep the rope and the bucket clear of the collecting board. On the central part of the

Fig. 3.

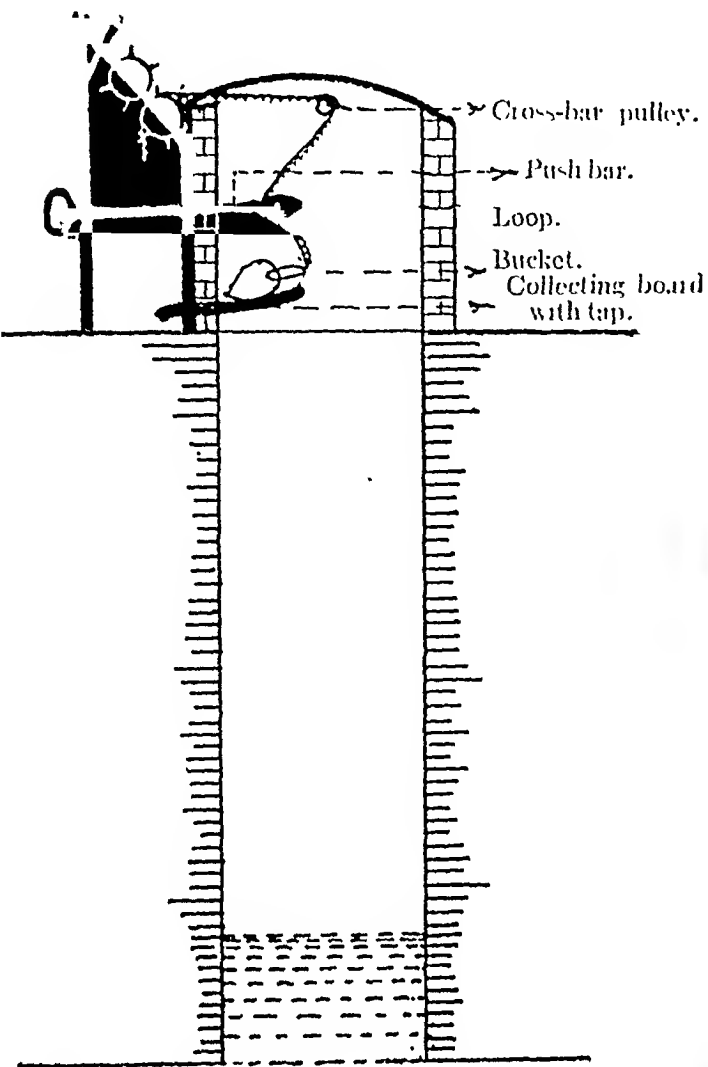
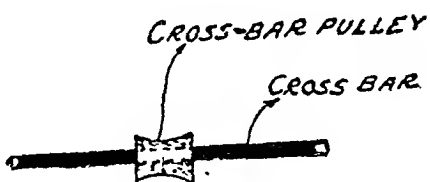
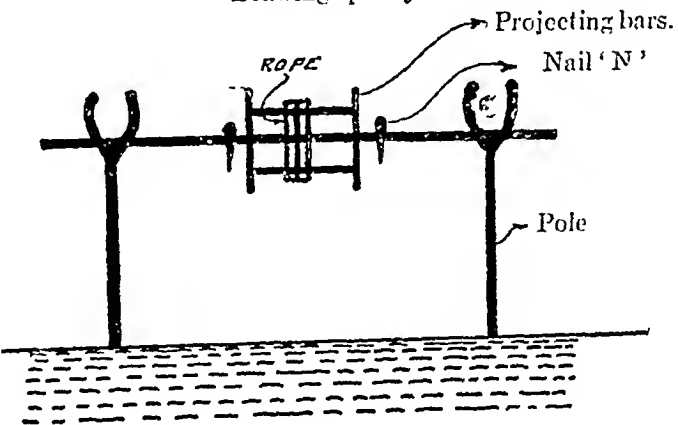


Fig. 4.
Drawing pulley.



(Continued at foot of next column)

A METHOD OF PLATING STOOLS

By D. READ

CAPTAIN, I.M.S.

District Laboratory, Kohat

THE following method of plating from stools has given satisfactory results in the district laboratory, Kohat. Some idea of the value of the method may be gathered from a perusal of the first hundred cases so dealt with. It is not however claimed that these results should be accepted as typical.

Method.—A saline suspension of the stool is prepared by the sweeper, centrifugalized to remove large particles and standardized to no. 3 or no. 4 Brown's opacity tube. From this one drop from a pipette standardized to no. 30 BSWG, which gave a volume of approximately 0.03 c.cm. with normal saline, is dropped into 20 c.cm. of normal saline and mixed. Care should be taken to draw up only one drop into the end of the pipette, and the same pipette can then be used for mixing the dilute solution so formed. After mixing, 10 drops with the same pipette are placed equally spaced over a 3½ inches bile-salt-litmus-lactose-agar plate and spread by rocking or rotating the plate between the fingers. By this method in many cases a perfectly even spread of between 50 and 200 colonies can be obtained.

Taking into consideration the effect of acid spread from acid-forming colonies, approximately 100 colonies was found to be the most convenient with a plate prepared to a pH. of 7.5. It will be clear that, as no part of the plate is more thickly spread than another, the chance of isolation of pathogenic organisms is greatly increased. Unfortunately, owing to the impossibility of gauging the proportion of viable and non-viable organisms in the emulsion, plates were sometimes too thinly, and rarely too thickly, spread.

The results obtained in a hundred trials are summarized below :—

- (a) Approximately 100 colonies on 37 plates.
- (b) Well over 100 but less than 200 colonies on 9 plates.

(Continued from previous column)

cross bar is located the cross bar pulley. The rope of the bucket passes over this pulley and then through a notch in the top of the wall and is attached to the drawing pulley. Both the pulleys are in the same level so that the rope is kept in a straight line horizontally from the cross-bar pulley to the drawing pulley (figure 1). The notch in the wall over which the rope passes allows sufficient room for the free play of the rope without any friction.

The rope is wound round the drawing pulley, which is turned by means of the projecting bar (figure 4). The play of the drawing pulley is restricted to the central part of the wall by the nails 'N'.

(c) Well under 100 but more than 50 colonies on 21 plates.

(d) More than 200 colonies on 20 plates.

(e) Less than 50 colonies on 13 plates.

These 100 plates were prepared from stools of individuals presenting themselves for carrier examination; none of these stools contained any mucus. The following organisms were isolated :—

Bact. flexneri—on three occasions,

Bact. typhosum—once, and

Non-mannite fermenters, indol positive—twice.

These six plates from which the above organisms were isolated all belonged to groups (a) or (b) of the above classification. Two strains of *Bact. flexneri* were isolated from (b), that is, plates on which there were more than 100 colonies but less than 200, and the rest from (a), that is, plates with approximately 100 colonies.

Control.—In a parallel series plated by the loop method no organisms were isolated.

The following are the advantages of this method :—

(1) It is standardized.

(2) If the technique is followed with even a moderate degree of accuracy, the results are good. Plating by ordinary methods requires experience.

(3) The whole plate is usefully employed.

The following are the disadvantages :—

(1) A sterile plate, or an almost sterile plate, may be obtained with annoying frequency, though this will also occur by the loop method.

(2) It takes time.

(3) It cannot of course be used for mucus-containing stools.

[*Note.*—An additional disadvantage in this method is that it demands an absolutely sterile plate, an ideal it is difficult to achieve with certainty in the hot humid plains of India. A small overlooked colony would lead to contamination of the whole plate, whereas by the loop method quite a large colony can be avoided.—*EDITOR, I. M. G.J.*

A NEW CAPSULE FORCEPS

By G. JOSEPH GNANADICKAM

Swedish Mission Hospital, Tirupatur, Ramnad District, South India

WITH reference to my paper in the *Indian Medical Gazette* of October 1932, on the intracapsular extraction of the senile cataract, I have been receiving many enquiries as to the forceps I recommend.

I was then using both Stanculeanu's and Elschmig's forceps; each had its own merits. Messrs. John Weiss and Son of London have made for me a new forceps, combining the advantages of those two forceps in one, and

eliminating their respective disadvantages to some extent.

This instrument is about the size of Stanculeanu's forceps, but the blades are very like Elschmig's. The double curvature on the blades is so shaped as to give a proper grasp of the capsule in its lower portion without touching the centre or pushing the cornea too much forward. The grip is firm, but never tearing.



The blades themselves are thin, taking very little space in the anterior chamber. The size of the handles and the spring action are such that one could actually feel the force used in the pinch.

I have so far used the forceps on over 500 cases and have found it to be very satisfactory. The above illustration shows the actual size of the instrument.

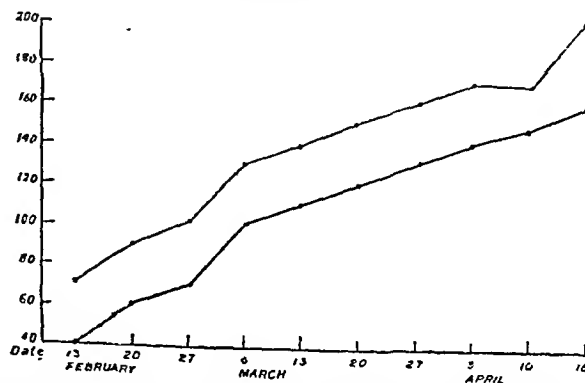
NUTRITIVE VALUE OF MUSTARD OIL

By B. B. BRAHMACHARI, D.P.H.

Director of Public Health Laboratory, Bengal

As I have shown in my article on the vitamin value of the food fats of Bengal (Brahmachari, 1932), mustard oil, i.e., the oil expressed from the seeds of the mustard plants, and ghee are the only two fats which enter, as such, into the dietary of the people of Bengal, and, of the two, mustard oil is the more important. It is taken throughout the province, in towns as well as in villages, with their daily food by the rich as well as the poor, while ghee is used more in towns than in villages, and is more or less limited to the well-to-do and the middle class

Weight increase in two rats on basic diet and mustard oil plus spinach.



people. As a rule mustard oil is cooked with the other food articles; but occasionally it is also taken mixed with boiled potatoes and other

vegetables, boiled eggs, roasted brinjals, etc. Though of such importance as food, it does not seem to have been studied from the point of view of its nutritive value.

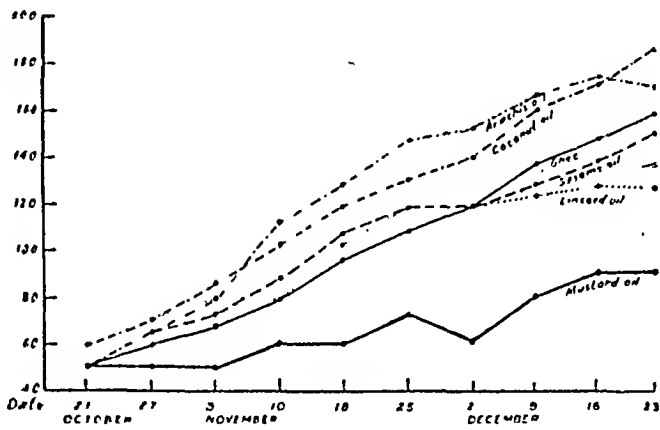
In my article referred to above, it was shown that mustard oil does not contain any vitamin A. In studying the vitamin value of the *kacha* ghee, i.e., ghee that has not been hard boiled, we had to test this oil again on three rats as control. The basal diet was the same, viz,

Casein	..	..	..	19 units
Starch	..	..	..	55 "
Yeast	..	..	..	5 "
Salt mixture (McCollum and Simmonds, 1918)	..	..	..	5 "

To this was added, as the fat portion of the diet, 16 units of mustard oil.

The three rats were all of the same litter, all females, born on the 23rd May, 1932. The experiment was started on the 14th July next, i.e., when they were seven weeks old and all weighed 70 grammes. They fared as follows :—

Weight increase in rats of a basic diet to which different oils have been added, as fat.



The nutritive value of mustard oil as compared with that of the other edible oils and fats.—For the experiment, we used the same diet as before, the fat being represented by the

WEIGHT IN GRAMMES ON VARIOUS DATES

Serial number	14/7	21/7	28/7	5/8	12/8	19/8	26/8	3/9	12/9	16/9	20/9
1	70	40	60	50	50	60	50	50	50	50	50
2	70	50	60	50	50	60	60	70	60	60	60
3	70	50	60	50	60	60	70	70	60	60	60

On the 20th September, i.e., after a period of nine weeks, they were below the weight at which they had started and were developing xerophthalmia. As their subsequent fate was obvious, the experiment was discontinued.

respective fats under experiment. The casein, however, was not soxhleted nor heated to destroy the vitamin that might be contained in the trace of milk fat remaining in it. The result is shown in the following table :—

WEIGHT IN GRAMMES ON VARIOUS DATES

	Date of birth	Fat given	WEIGHT IN GRAMMES ON VARIOUS DATES									
			21/10	27/10	3/11	10/11	18/11	25/11	2/12	9/12	16/12	23/12
Male	18-8-32	Ghee	50	60	70	80	100	110	120	140	150	160
Female	"	"	50	60	70	80	90	100	110	110	120	130
Male	"	Arachis oil.	50	65	80	110	125	145	150	165	175	170
Female	"	"	50	65	70	80	90	100	110	120	145	littered
Male	21-8-32	Sesame oil.	50	65	75	90	110	120	120	130	140	150
Female	"	"	50	70	80	85	105	110	110	120	littered	..
Male	"	Linseed oil.	60	70	80	80	105	120	120	125	130	130
Female	"	"	40	50	60	60	70	75	90	littered	..	..
Male	"	Coconut oil.	60	70	85	100	120	130	140	160	175	185
Female	"	"	50	60	65	75	90	100	100	115	115	125
Male	"	Mustard oil.	50	50	50	60	60	70	60	80	90	90
Female	"	"	40	died 24/10	..	..	..	..	..	..	..	..

Growth of the rats was quite satisfactory with all the fats except mustard oil. Coconut oil is shown by McCarrison (1929) to contain some vitamin A, but to be poor in it, and gingelly (*i.e.*, sesame oil), linseed oil and ground nut (*i.e.*, the arachis oil) to contain very little. So the growth under them is largely due to the trace of milk fat which was in the casein and

vitamins A, B and C. So I next proceeded with six rats of the same litter born on 19th December, 1932, placing them under the same diet containing mustard oil, but adding enough of spinach for vitamin A. The experiment was started on the 13th February, 1933, *i.e.*, when they were 8 weeks old, with the following results:—

WEIGHT IN GRAMMES ON VARIOUS DATES											
		13/2	20/2	27/2	6/3	13/3	20/3	27/3	3/4	10/4	18/4
Male	..	70	70	100	120	125	125	140	150	150	170
Female	..	50	50	60	90	100	110	120	130	littered	..
Male	..	70	70	90	120	130	140	150	160	170	..
Female	..	50	50	60	80	85	100	110	150	littered	..
Male	..	70	90	100	130	140	150	160	170	170	200
Male	..	40	60	70	100	115	120	130	140	150	160

was not removed, nor rendered inert, as in the previous experiments. If so, the poor growth under the mustard oil with the same casein is analogous to the phenomenon observed by Fridericia (1924); he found that by adding hydrogenated whale oil to a diet in which the vitamin was supplied by butter fat the vitamin A of the latter was inactivated. In this case the mustard oil appears to have inactivated the vitamin A in the casein.

The nutritive value of mustard oil when given along with sufficient quantity of vitamin A.—Spinach is known to be rich in vitamins; McCarrison shows it with three crosses (*i.e.*, rich in vitamin) under each of the three

Conclusion.—We may fairly conclude that mustard oil—

- (i) is entirely destitute of vitamin A,
- (ii) tends to inactivate vitamin A in other food articles given along with it,
- (iii) but, as fat, is as nutritive as other fats, provided sufficient vitamin A is supplied in other articles of food.

REFERENCES

- Brahmachari, B. B. (1932). *Indian Med. Gaz.*, Vol. LXVII, p. 377.
 Fridericia, L. S. (1924). *Journ. Biol. Chem.*, Vol. LXII, p. 471.
 McCarrison, R. (1929). *Food*. Macmillan and Co., Ltd., Madras.
 McCollum, E. V., and Simmonds, N. (1918). *Journ. Biol. Chem.*, Vol. XXXIII, p. 55.

A Mirror of Hospital Practice

A CASE OF WEIL'S DISEASE OR INFECTIVE JAUNDICE

By A. D. LOGANADAN

MAJOR, I.M.S.

ASSISTANT SURGEON C. M. E. EYLES, I.M.D.

and

SUB-ASSISTANT SURGEON BACHAN SINGH, I.M.D.
 Burma District, Maymyo

A BRITISH OFFICER, aged 52, stationed in Maymyo since February 1933, reported sick on the morning of the 29th September, 1933, complaining of headache and severe pain in the limbs, especially the legs.

Temperature varied between 99° and 101°F., the pulse was irregular and there were frequent extrasystoles. He fainted in the toilet room that evening, and was therefore admitted into the British Military Hospital, Maymyo, the same day.

Previous history.—He had been out snipe shooting three times at intervals of seven days, each time to the same spot, the sixth mile stone from Mandalay, east of the road. The last time was on the 27th September, 1933, *i.e.*, two days before reporting sick. He said that on that day he felt off colour and owing to pain in the legs he could not cover the usual long distances even after long intervals of rest.

Progress in hospital.—The patient ran an irregular temperature, ranging from 99° to 101°F., for four days, the pulse becoming more regular with rest. On the 2nd October, 1933, he was slightly jaundiced and the breath was offensive, and was put on fat- and protein-free fluid diet.

Urine examination: Specific gravity—1016, acid, smoky, albumin present and the deposit showed a few pus cells, red blood cells and epithelial cells.

3rd October.—Jaundice greatly increased; urine—8 ounces; sweated profusely, clothes having to be changed five times.

4th October.—Jaundice increased; bowels not opened; had not passed urine since previous midday; was put on alkaline diuretics and antiphlogistine applied over loins.

5th October.—The temperature was down to normal; he spent a restless night; bowels opened thrice after salts; stools clay-coloured; no urine passed; dry cupping to loins twice a day; catheterized urine—three ounces; blood pressure 110/73.

Laboratory findings:—

White blood cell count 16,000 per cubic millimetres

Differential count—

Polymorphonuclears	93 per cent
Lymphocytes	6
Large mononuclears	1

Blood smears were negative to malarial parasites and spirilla of relapsing fever.

Urine	..	..	no deposit
Urea	..	..	0.8 per cent
Albumin		++	
Blood urea	..	..	0.116 per cent

Van den Bergh's reaction was 'direct immediate'.

Two guinea-pigs were inoculated intraperitoneally, one with two cubic centimetres of blood and the other with centrifugalized deposit of urine.

6th October.—Patient complained of loss of memory; later in the evening was drowsy; clay-coloured stools passed three times after salts; urine not passed; catheterized urine 1½ ounces, showed a thick deposit containing pus cells in large numbers entangled in fibrinous strands, there were only a few leucocytes, no red blood cells or casts; 18 ounces of blood was withdrawn and 40 cubic centimetres of 30 per cent saline was run into the vein; frequent feeds of orange juice containing glucose were given.

7th October.—Urine not passed; catheterized specimen measured 92 cubic centimetres; albumin 0.01 per cent. Urea 0.7 per cent. Deposit showed pus and renal cells, epithelial and granular casts; no red blood cells, no leptospira seen under dark-ground illumination.

Blood urea—0.126 per cent. Culture—*B. coli* isolated. Patient slept for long intervals with the help of chloral hydrate; did not perspire but skin was moist and warm; was beginning to show signs of air hunger in the early afternoon; was restless and delirious and was with difficulty restrained from getting out of bed; respiratory distress much relieved by oxygen; had a mild uræmic convulsion at 5 p.m. Patient died at 7-10 p.m.

Report on the animal inoculation

The guinea-pig inoculated with centrifugalized deposit of urine on 5th October, 1933, was still alive and well on the 28th October.*

That inoculated with 2 cubic centimetres of blood looked healthy and normal till the evening of the 16th October, when it had its usual food, but on the morning of the 17th October, it was seen to be intensely jaundiced, was very ill, lying still with increased respiration. Died at 10 a.m. and a post-mortem examination was immediately carried out.

Post-mortem examination.—Serous membranes and muscles were intensely jaundiced. Subcutaneous fat and fat about the kidneys was deep yellow; extensive subcutaneous hæmorrhages were seen all over. Lungs shrunken with extensive hæmorrhagic patches. The liver was normal in size, but yellow in colour. The kidneys were swollen and tense and on section the substance bulged on account of tension. The supra-renals appeared normal.

Blood from heart, and urine from bladder, showed no leptospira, under dark-ground illumination or Giemsa's and Fontana's stain. Culturally no growth was obtained in serum medium (Fletcher's) for 8 days at room temperature.

* [Leptospiræ do not appear in the urine before the end of the second week, usually when the patient is convalescent. In this case it was the 7th day of definite illness—the 9th day if the two days of malaria are included—when the guinea-pig was inoculated with urinary deposit; it is not surprising therefore that it survived. On the other hand, an interesting feature of the case is the infection of the other guinea-pig; the leptospiræ usually disappear from the blood before the end of the first week of the disease.—EDITOR, I. M. G.]

Sections of liver stained by Levaditi's method show a great number of leptospiræ in between the cells.

Sections of kidneys by Levaditi's method also show leptospiræ, but they are fewer, scattered here and there.

Sections stained by Giemsa's, Leishman's and hæmatoxylin Biebrich scarlet did not reveal any leptospiræ.

Comments.—The interesting points in this case are:—

1. At the time the patient reported sick, there was a mild but extensive epidemic of influenza amongst the Burman troops, so a provisional diagnosis of influenza was made. Fainting in quarters and the irregular heart necessitated early admission into hospital.

2. The patient showed signs of defective functioning of the kidneys very early in the disease. As he was heavily built and rather plethoric a large white kidney was suspected.

3. The early intense jaundice with a total white count of 16,000 per cubic millimetres and absolute and relative increase in polymorphonuclears made one suspect Weil's disease group. Though the blood was inoculated on the ninth day of the disease the guinea-pig was successfully infected.

4. Taylor and Goyle in their account of an epidemic of leptospirosis in Andamans (*Indian Medical Research Memoirs*, No. 20 of March 1931) mention a typical case in the Rangoon General Hospital in which they were able to demonstrate leptospira in the kidney.

No other case has so far been reported as having occurred in Burma.

Our thanks are due to Captain C. A. Levy, R.A.M.C., for allowing the use of his notes on the case and also to Lieutenant-Colonel A. H. T. Davis, Commanding British Military Hospital, Maymyo, for permitting publication of this case.

A CASE OF PROLAPSED UTERUS*

By M. A. GHANI, L.M.F. (Bengal)

Medical Officer, Civil Dispensary, Bag (Gwalior State)

RECENTLY, I was called to see a Hindu female, a multipara, aged about 25 years. She had been delivered of a normal male child eight hours before, with the assistance of a *dai*. The latter had extracted the placenta so forcibly that the uterus was completely extorted. The *dai* and several other persons had tried to replace the uterus without success.

At first, I tried to replace the uterus without an anæsthetic, but the patient could not stand the pain, and her vaginal muscles were also very rigid, so she was given chloroform. The foot of the bed was raised and the patient's legs were held up, when the uterus was easily replaced. A firm bandage was applied and she was given a quinine and ergot compound three times a day, and she made an uneventful recovery.

It is remarkable that there were no signs of sepsis although the uterus had been extensively handled by the *daïs* without any antiseptic precautions.

* Rearranged by Editor.

Indian Medical Gazette

JUNE

TROPICAL PHAGEDÆNIC ULCER (NAGA SORE)

Of the non-fatal diseases that occur in tropical countries one of the most important is tropical phagedænic ulcer, or *ulcus tropicum*. From the personal point of view the disease is important because it is painful, disabling, and difficult to treat; the most likely victim is the bread-winner of the family, and he is incapacitated at a time of year when his services in the fields are most valuable. From the point of view of the employer of labour it is important because the ulcers are liable to appear in epidemic-like waves and he may suddenly find a large percentage of his carefully-nursed force unable to work at the busiest season of the year, and because there do not seem to be any short cuts to treatment nor any well-defined preventive measures to be adopted.

The individual sufferer usually finds that he gains little official sympathy until he can contrive to swell the mortality returns, and, as *ulcus tropicum* is not a recognized cause of death, he, as an individual, would normally have been left to suffer in silence and to apply cowdung or whatever domestic remedies are in vogue in the particular part of the country where he is living; when, however, the individual becomes a unit of a labour force, his enforced idleness is a matter of concern to others besides himself, the disease from which he is suffering acquires a greater degree of importance, and action is demanded from the medical profession. It is possibly for this reason that *ulcus tropicum* has acquired a reputation as mainly a disease of tea-estate labour forces; it is known that the disease does occur amongst the field workers of the rural population in different parts of India, but from the available returns it is difficult to estimate to what extent its special affinity for tea-estate labour forces is real and not merely apparent.

Elsewhere in this issue will be found a paper on Naga sore, contributed by a tea-estate medical officer. The name 'Naga sore' is one of the many local pseudonyms that *ulcus tropicum* has acquired, and it is probably the one in most common use on tea estates in India. In his covering letter the writer apologizes for not having carried out any bacteriological investigations and for his failure to record any new facts. His apology is unnecessary; tea-estate medical officers seldom have the time or the facilities for carrying out bacteriological investigations, but they are in a position to report epidemiological and clinical observations which may be of great value to the investigator

who is trying to unravel the problem of the prevention and treatment of this condition, and are infinitely more useful than the spasmodic and pseudo-scientific essays at the problem with the help of the microscope that are usually claimed as 'research'.

There seems to be no longer any doubt that the pathology of Naga sore is similar to that of *ulcus tropicum*. In 1921 Fox (*I. J. M. R.*, VIII, 694) showed that the fusiform bacillus and the spirochæte could usually be recovered from a typical sore, but Roy (*I. M. G.*, LXIII, 673) found that, though the typical fusiform bacillus could be found in most of the cases he investigated, the associated spirochæte was only rarely present. Acton and Panja in 1932 investigated the pathology and bacteriology of Naga sore on some coolies sent down to the School of Tropical Medicine from the tea districts; they showed that the fusiform bacillus, an anaerobe that could be isolated and cultivated with comparative ease in a special medium, when inoculated by itself did not give rise to any ulceration, but, when it was inoculated with either the pyogenic cocci or the diphtheroids that were often present in the ulcers, the typical ulcer followed. In their inoculation experiments they were able to produce the typical ulcer on the leg; but inoculations on other parts of the body resulted only in abortive lesions. They cut histological sections of these ulcers and found that 'the edges were undermined and on the floor of the ulcers there was a slough; under this slough the fusiform bacilli formed a dense felted layer on a vascular granulation layer, the granulation tissue extending to the fascia', to quote from Colonel Acton's report. The ætiology of the ulcer thus becomes clearer; a septic wound or an infection of the skin is an essential precursor; on to this the fusiform bacillus is superimplanted; this bacillus produces a membrane-like slough under which anaerobic conditions are maintained and the organism flourishes. The observations that the ulcers are more easily formed on the legs is important. Other observers have also drawn attention to the fact that they tend to form on the parts of the skin where the blood supply is poorest. The spirochæte, *Spirochæta vincenti*, does not appear to be a constant finding and there is no evidence that it plays any part in the pathology of the disease.

Nothing definite is yet known about the method of spread of the infection and recent work has not thrown any new light on the epidemiology of the disease. It is very definitely seasonal; practically all published records show June as the month of highest incidence, that is to say, it is associated with the onset of the rains rather than with their full development. It occurs mainly in coolies working amongst the tea bushes rather than amongst those working in the factory, and Roy claimed that in a village where half the inhabitants

were part-time employes on a tea estate and the other half were working in their own fields only the former were infected; this is a very important point and worthy of more thorough investigation.

Again, infants and young children appear to escape, whereas adolescents and young adults are most frequently attacked. The incidence amongst men is slightly higher than amongst women. This distribution of the incidence of the disease amongst various groups, age, sex, and occupational, may be explainable on the grounds that the groups most liable to predisposing injuries are most heavily infected, but more figures regarding the relative incidences within the various groups are necessary before this explanation can be accepted. The usual explanation is that the coolies working amongst the tea bushes are very liable to get their legs scratched, but it is interesting that in Roy's series trauma was not the main predisposing cause; for example, in 222 cases of ulcer on the leg, trauma was given as the predisposing cause in only 82, or 37 per cent, whereas 'itching from dermatitis' was the story in 100 cases.

According to Dr. Ghosh's observations, new coolies are more often affected than those who have been established on the garden for a year or more. At the same time there is little evidence that any immunity is acquired by an attack; instances are frequently reported of a fresh ulcer commencing before the first has completely healed up, and the same coolie will often get an ulcer about the same time, year after year.

There is little evidence that the disease is spread directly from one person to another, as a general rule; in fact, experimentally the ulcers are not easily produced. Dr. Ghosh reports four cases from the same family, but the association here may have been in the predisposing factor; and family incidence is not usually reported.

The 'eye-fly', *Siphonella funicola*, is popularly associated with actual transmission of the infection from one person to another. The period of greatest activity of these flies coincides with the period of greatest incidence of the disease, and they certainly settle on the sores and become a great source of annoyance to the patients, but there the case against this fly seems to end. Experimental work with the eye-fly has given no support to this theory; failures to transmit the disease experimentally need not be taken too seriously, but Roy demonstrated that when these flies do ingest the fusiform bacillus it shows signs of rapid degeneration, and there are epidemiological facts that are difficult to explain, e.g., the extreme rarity of lesions on the upper parts of the body—though above we have suggested another possible explanation for this—and the distribution amongst the different age, sex, and occupational groups. It seems far more likely that the fusiform bacillus is a free-living organism associated with

certain types of soil, reaching its maximum development at the end of the hot weather; being an anaerobe it would not be spread in the dust—even if it could withstand the desiccation—but would normally remain below the surface to be disturbed and spread in the first mud of the rains, and later as the rains continue it would be washed out of the soil.

The irregularity of the incidence of the disease—its frequency in one district and rarity in another, and the variations in its incidence from year to year—might easily be explained by fundamental differences in the soil or by differences in the manurial treatment to which the soil has been subjected.

The factor that does not seem to have been taken into consideration with references to Naga sore in India, though it has been with reference to ulcer tropicum in other parts of the world, is the nutritional factor. In Africa, calcium deficiency has been suggested as a predisposing cause, and calcium and parathyroid prescribed as an essential part of the treatment. We have not seen any reports regarding the results of this form of treatment recently, so it is possible that it has not been as successful as at first it promised to be, but there are many other possibilities in the way of food deficiencies that would be worth exploring. The skin is notoriously susceptible to food deficiencies even when the general nutrition of the body appears to be well maintained, and the tea-estate coolie, though he is assured of sufficient rice, is often unenterprising regarding the other items of his diet. This will apply particularly to the new coolie who is a stranger in the land and knows nothing of, and probably has little taste for, the various accessory food substances available locally that help to supply essential dietetic substances amongst people who seldom eat meat or drink milk. The age and sex distribution may, as we have suggested above, be explainable on other grounds, but it is known that there are slight variations in the nutritional requirements of the different age groups, and it is possible that there are differences in the dietetic habits. In Dr. Ghosh's series there is a striking difference between the age distribution in males and females; the difference may be dependent on chance, the numbers being small, or on the greater number of young girls employed amongst the tea, but there is a possibility that the earlier development of females in this country may in some way be an associated cause. To summarize, it cannot be claimed that the case in favour of a nutritional basis to predisposition to Naga sore is as yet a strong one, but it is an aspect of the problem that has hitherto been neglected. Before the case can be judged more epidemiological facts and figures, which can only be supplied by the man actually working in the areas where these sores occur, are necessary; that is to say, it is field rather than laboratory work that is at present most urgently required.

Dr. Ghosh has suggested that the ulcer is normally self-limiting and that if it is left alone it will eventually heal; this is not the general opinion of writers on this subject. A point in favour of this suggestion is the considerable degree of uniformity in size and shape that the ulcers usually present; the large serpiginous type, involving half the circumference of the leg, is however not infrequently encountered. It would probably be worth investigating whether the unchecked extension in these cases is due to some secondary aetiological factor, such as syphilis. It is not a point of great practical importance whether the ulcers, untreated, will eventually heal or not, as in any case the process would be a protracted one; rapid healing is to the advantage of all concerned and is always the main objective of those who have to treat them.

There is almost complete uniformity of opinion regarding the first stages of treatment; here practice agrees with the principles of treatment that are based on our knowledge of the pathology of the disease. Before any improvement can be expected to take place the slough and necrotic tissue must be removed; some form of vigorous treatment is indicated, either surgical scraping or frequent hot fomentations, followed by thorough cauterization of the base by pure carbolic acid, strong copper sulphate (25 per cent) and carbolic acid solution, or powdered potassium permanganate, the last-named being very painful and for that reason not to be recommended where popularity of the treatment is aimed at. The fusiform bacillus is an anaerobe and therefore does not flourish under these conditions; once the ulcer can be made to present a healthy granulating surface healing will commence and usually proceed uninterruptedly. Should however the slough re-form, it must again be removed.

Over the next stage of the treatment there seems to be a variety of individual opinions; some recommend the frequent application of the caustic lotion, others daily or twice-daily bathing with milder antiseptic lotions followed by wet dressing, dry dressing with cyanide gauze, dusting with an antiseptic powder, or the application of an antiseptic ointment. Iodoform seems to be popular both as a powder and as an ointment; a powder containing one part of iodoform and three of subgallate of bismuth is used at the Calcutta School of Tropical Medicine, and gives good results.

From Africa comes the suggestion that a modified form of the Winnet-Orr treatment for osteomyelitis should be used; one can see great administrative advantages in adopting this method, but it is essential that the ulcer should first be brought to the healthy granulating stage, otherwise it would seem that the procedure were playing into the hands of an anaerobic organism. A paste containing zinc oxide (1 part), and iodoform (2 parts) in liquid paraffin, made up to the consistency of clotted cream, is

applied freely to the granulating ulcer, over this is placed gauze and cotton-wool, and finally a plaster of Paris bandage is applied to the whole circumference of the limb extending several inches above and below the ulcer. As an alternative to the plaster of Paris, the limb can be bound round with adhesive surgical plaster, but this would certainly be more expensive. The ulcer remains 'locked up' in this dressing for at least a week. If this procedure is successful—and in Africa it is claimed that it is—it possesses many obvious advantages, amongst which are that the patient cannot interfere with the dressings and that the treatment is ambulatory.

Without any exact knowledge regarding the mode of spread of the disease, it is not possible to suggest specific preventive measures, but, on the assumption that there is an essential primary lesion on to which is implanted a secondary anaerobic infection that probably comes from the soil, certain preventive measures have been adopted on tea estates. One of the most popular of these is to make the coolies, on their way back from work, walk through a tank containing some antiseptic lotion. This seems a rational procedure, but we have never seen any strong evidence adduced in its favour; weak antiseptic solutions are liable to be a snare, and it seems just possible that if the antiseptic solutions were not strong enough, a common tank, through which hundreds of coolies walk daily, might soon become a rich culture of septic and other organisms, and at the other end of the scale if the antiseptic solutions were too strong it might give rise to dermatitis in the specially susceptible. There seems to be room for further statistical and bacteriological investigation of this method of prevention. On the other hand, individual washing of the feet with weak antiseptic solution or even with plain water could only do good, but in a tea-estate labour force it would be practically impossible to enforce this procedure.

The wearing of puttees is again a rational measure, if trauma is the main predisposing cause, but if 'dermatitis' is the commoner precursor, as Roy's figures suggest, then damp puttees would probably not help matters. We believe that this measure has been tried, but we have seen no reports regarding its success or failure.

Another method, one that Dr. Ghosh suggests, is the frequent careful inspection of the legs of coolies and the early treatment of any cuts or other skin lesions on the legs with iodine, mercury ointment, or whatever the special condition indicates. This measure to be successful will demand the personal attendance of the assistant medical officer at 'leaf-weighing', but in estates where this condition is a serious problem each year it might be worth adopting, even if it meant employing temporarily an additional assistant medical officer.

Special Articles

THE SIGNIFICANCE OF THE THYRO-THYMIC LYMPH SYSTEM

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THE thyro-thymic lymph system, what is its significance; does the presence of such a system help us to a better understanding of thyroid conditions; does it in any way help us to correlate the histopathological with the clinical condition in cases of thyroid dysfunction?

To appreciate better the significance of the thyro-thymic lymph system, attention must be drawn to certain facts with regard to the structure of both thymus and thyroid.

The discovery of the thyro-thymic lymphatic channels is not of recent date, but was the result of work done by Sir Astly Cooper, who described them in 1832. Recently, Sir Arthur Keith has found in the museum of the Royal College of Surgeons, England, injection specimens of thyroid and thymus attributed to Sir Astly Cooper.

In a 'Physiological essay on the thymus gland' Simon in 1845 demonstrated that in birds and mammals the thymus was a neck organ, the bulk of the organ indeed being not mediastinal, but lying anywhere in the region above or below the thyroid. Simon pointed out that structurally the thymus consisted of plicated, sacculated tubes lined with endothelium, the saecules containing aggregations of lymphocytes.

The lymph channels, the essential structural feature of thymus, persist throughout life. It is the function of the thymus which changes, and this only quantitatively, because it can be shown that the lymphocytic function may persist to some degree throughout life.

These lymph tubes of the thymus are the blind terminals of the special thyroid lymphatics, and the reservoir for the storage of the special lymphogenic secretion of the thyroid. Thus the thyroid and thymus are but different parts of the same organ, as Sir Astly Cooper's injection specimens would show.

In Graves' disease there is a great increase of the lymphoid tissue of the thymus, which is shared in by those aggregations of epithelial cells, known as Hassal's corpuscles, the finding of which in sections is taken as evidence of thymic tissue. This dual increase is also observed when an animal is fed on thyroid.

Let us turn now from the extra-thyroidal portion to the intra-thyroidal portion of the thyro-thymic lymph system to the thyroid gland itself; lymph spaces within the thyroid were described by Boechat in 1873 and by several investigators since that date. The thyroid consists of groups of follicles, each follicle consisting of

columns of thyroid epithelium lying in a lymph space, bathed with lymph. Groups of such follicles, separated by perifollicular and inter-follicular lymph spaces, are enclosed within a fibro-elastic capsule lined with endothelium. Such a group is known as a lymph sinusoid or gland unit, and groups of gland units, clustering round a central intralobular lymphatic, constitute a lobule of the thyroid gland. These central intralobular lymphatics, draining lymph from the sinusoids, unite as interstitial lymph channels and run in the interstitial tissue of the gland with the branches of the main artery of the thyroid, the inferior thyroid.

These lymphatics emerge as discrete trunks at a well-marked hilum on the postero-mesial aspect of the gland, where the artery enters. It is important to note that these *special lymphatics* do not follow the veins, but run with the arteries. The ordinary lymphatics of the thyroid accompany and emerge with the veins, which are spread all over the capsule of the gland. These are the *lymphæ comites* and drain into the deep cervical glands.

The special lymphatics can be traced up and down the neck as discrete vessels and end in thymic tissue, whether that tissue be in the mediastinum, in the region of the thyroid itself, or on the lateral aspect of the neck in the region of the mastoid process.

We must note therefore that the thyroid gland has two sets of lymphatics—(1) special or specific lymphatics, which course with the arteries and drain into the lymph channels of the thymus, and (2) *lymphæ comites*, the ordinary lymphatics, which emerge with the veins and drain, as do lymphatics from other organs, into lymph nodes, in this case into the deep cervical lymph glands.

The proof that the lymphoid nodes into which the special lymphatics drain are thymus depends on the presence of Hassal's corpuscles in the tissue. Pathological material also provides proof of the course taken by these special lymphatics; in malignant disease the growth can sometimes be traced from the thyroid sinusoids along the lymphatics to the thymic nodes.

In lymphadenoid goitre in man, and in the similar condition produced experimentally in rats by Sir Robert McCarrison, the whole of the thyro-thymic lymph system can be demonstrated to be filled with lymph and proliferating endothelium. Further Williamson and Pearse, from a study of comparative anatomy and embryology, infer that the thyro-thymic lymph system of mammals is derived from a thyroid gill lymph system found in fish.

In man the gills have disappeared, but the original lymph space remains as the thyro-thymic lymph system, to fulfil some function which was once included in the general respiratory function in fish.

Perhaps herein lies a clue to the function of the thyroid apparatus as a whole in man.

Does this fact of a thyro-thymic system, filled with lymph, lymphocytes and proliferating endothelium, throw any new light on the physiology of the thyroid?

Histologists have maintained that some secretion of the thyroid actually leaves the gland by the lymphatics. Thyroid activity being bound up in the mind of the physiologist with iodine and iodo-colloid (thyroxin) alone, no proof of the histologists' statement was forthcoming.

This secretion, which leaves the thyroid by the special lymphatics, contains no iodine nor is iodine or thyroxin found in the thymus. It has nothing to do with iodo-colloid, with that peculiar intermingling of function where iodine is brought to the thyroid in the blood, colloid is stored in the vesicles, and thyroxin is discharged from the gland by the blood stream.

What then is this secretion of the thyroid?

Williamson and Pearce have shown that 'this secretion is the misnamed secretion of hyperplasia, with which physiologist, pathologist and surgeon alike are so familiar. This secretion is not only histologically different from iodo-colloid, but neither is its chemical nor is its biological action that of iodo-colloid. The two secretions are in fact distinct entities: they are neither similar nor derivative. This other secretion can be seen traversing the epithelium from the lumen of the follicle to enter the pericellular lymph spaces, and, as we have already seen, can be followed from thence into the thymus. On reaching thymic tissue it stimulates the endothelium of the lymph spaces to produce lymphocytes. Under certain normal conditions this secretion may even stimulate the endothelium of the thyroid lymph sinusoids or the interstitial lymph channels of the thyroid to emulate the thymus producing thereby a characteristic aggregation of lymphocytes in the thyroid. In other words this secretion can stimulate the production of lymphocytes throughout the thyro-thymic lymph tract. The secretion is in fact a lymphogenic substance which iodo-colloid (thyroxin) is not'.

Experimental work shows that the implantation into the peritoneal cavity of dogs, of thymus from cases of Graves' disease produces the full syndrome of the disease.

Williamson and Pearce point out that this thyrotoxicosis is due to the failure of the lymphocytic endothelium of the thymus to effect the natural detoxication of the normally toxic lymphogenic secretion of the thyroid, which is normally stored in the thymus.

Thyroid then possesses two lymphatic systems and produces two secretions, one the iodo-colloid, the other the lymphogenic.

Do these facts with regard to the physiology of the thyroid help us towards a better terminology in our classification of the varieties of goitre?

Dunhill very correctly says 'I cannot agree that the clinical condition of the patient should

be ignored and only the histopathological appearances used in the grouping of goitres'.

I feel that clinicians will appreciate the classification of Williamson and Pearce, the names giving clear pictures of the possible combinations of the functions of the two secretions of the thyroid.

A study also of various classifications shows clearly how the various histopathological findings overlap and how the varied clinical conditions intermingle.

From a classification based on histopathology one passes to one based on a consideration of stimuli normal and abnormal on a gland which may be normal, subefficient, or diseased, and finally to a classification that pictures the possible combinations of two functions, colloid function and lymphogenic function.

If we attempt to answer Boyd's question 'Is this hyperplasia the cause of the hyperthyroidism?', we open up the big question of the relation of thyroid to Graves' disease. If the hyperplasia is the thyroid's response to the demands of the body for some additional secretion, then removal of the large parts of a struggling gland is hardly the way to help out the demand. If however the pure hyperplasia of Graves' disease results in the overproduction of a toxic secretion with which thymic endothelium is unable to deal, then it is reasonable to remove, in part at least, the seat of manufacture of the toxin—the thyroid gland.

Among the lymphatic conditions of surgical interest, which an appreciation of the thyro-thymic lymph system may help to explain, are the cystic hygromas. These swellings are endothelial-lined cysts; they occur in positions where thymic tissue is to be found, and they tend to manifest themselves or enlarge at those times when the lymphogenic activity of the thyroid is enhanced, namely just after birth and again about puberty.

Are cystic hygromas then due to developmental abnormalities in the thyro-thymic lymph tract? Of perhaps more serious interest is the relation of thyroid lymphatics to thyroid neoplasms, and the vexed question of their resulting metastases, the confusion centring around these being evidenced by the series of anomalous names used to describe thyroid tumours.

Every surgeon is aware of the frequency with which some thyroid cancers invade the mediastinum without invading the deep cervical glands and how these cancers may be found anywhere in the neck from the mediastinum to the base of the skull, and how on the other hand some cancers invade the cervical lymph glands.

It is held that for the three classes of thyroid carcinoma, (1) scirrhus or carcinoma simplex, (2) papilliferous adenocarcinoma, and (3) malignant adenoma, the first two disseminate to lymph nodes, while the third, the malignant adenoma, does not do so, so long as it is contained within its capsule, but that, even while the primary growth is small and the capsule still intact,

CLASSIFICATIONS OF THE VARIETIES OF GOITRE

AUTHOR.

DIFFUSE GOITRE WITH INVOLUTION.

(including)

E endemic or simple

Goitre of adolescence

The vague Colloid goitre

Hyperplasia - compensatory

Involution

Hyperinvolution - [with development of colloid goitre]

Stroma changes - [with formation of nodules]

colloid or foetal

The adenoma - a mere incident in the

course of the pathological process, has nothing to do with the thyrotoxicosis which may develop.

These are not true adenomata but rather involu-

PHYSIOLOGICAL ENLARGEMENT.

(including)

Adolescent goitre

Hyperplasia -

Involution

Hyperinvolution

Stroma changes and fibrosis

physiological

normal

Stimulus

Gland

(1) Diffuse involutional goitre, with sooner or later nodular changes and

(2) Nodular involutional goitre (non-toxic adenoma)

1. Single - colloid adenoma - cystic adenoma,

2. Multiple - 'pudding' goitre (de Quervain).

physiological, if excessive.

normal or sub-efficient.

COLLOID HYPERTROPHY

Function - normal

Iodo-colloid secretion and storage - normal

Lymphogenic secretion - normal

Function - Iodo-colloid storage predominating.

Lymphogenic secretion in abeyance.

STROMA PARENCHYMATOSA ET COLLOIDES.

CONTINENTAL WORKERS.

A classification which shows that continental workers realized earlier than did English investigators that the varieties of goitre depended on a combination of the functions of the thyroid secretions.

MODULAR GOITRE.

DIFFUSE GOITRE WITH HYPERPLASIA.

Cause unknown - commonly held to be due to over production of the internal secretion of the thyroid.

Diffuse hyperplasia - not compensatory

Development of adenomata - involution

Definite collections of lymphocytes in the stroma.

Is this hyperplasia the cause of the hyperthyroidism?

The hyperplasia may disappear and the gland revert to a colloid condition and still the symptoms of hyperthyroidism persist.

Histopathology

TOXIC GOITRE

(1) Primary (Graves) diffuse hyperplasia - not compensatory.

(2) Secondary

Stimulus - abnormal, accompanied by alteration in secretion.

Gland - normal - sub-efficient or diseased, with resulting thyrotoxicosis, the degree depending on the condition of the gland. If a normal gland then profound: if a diseased gland less profound depending upon the amount and quality of active thyroid tissue left to react.

LYMPHOGENIC HYPERTROPHY.

Function. Iodo-colloid storage in abeyance.

Lymphogenic secretion predominating, not being toxicated.

STROMA PARENCHYMATOSA DIFFUSA.

dissemination may occur by invasion of blood vessels. Why this atypical distribution? Simply because there are two distinct sets of thyroid lymphatics.

The carcinoma simplex and the papilliferous carcinoma invade lymph nodes *via* the lymphæ comites, the ordinary capsular lymphatics. The malignant adenoma invades the special lymphatics, the thyro-thymic lymph system, and remains within it until blood vessels are invaded. There we have a broad classification of thyroid tumours: (1) those which invade the ordinary capsular lymphatics, and (2) those which invade the thyro-thymic lymph system.

Again, why these anomalous names for thyroid tumours—e.g., aberrant thyroid tumour, metastasizing adenoma, benign metastatic, benign recurrent adenoma, and benign metastasizing goitre.

Why? Because it was not realized that the thymus, including the nodes of thymic tissue in the neck, and thyroid were functionally one apparatus, and that a growth, confined within the thyro-thymic lymph system, was still a growth confined within the organ of its origin.

For instance an aberrant thyroid tumour is explained, so I take it, as a secondary growth occurring in a near or distant thymic lymph node, that is, still within the thyro-thymic lymph system. Those who hold this idea are of course fully aware of the theories of origin of lateral aberrant thyroids, from isolated branchiogenetic rests, from the ultimo-branchial body, a remnant of the fifth pharyngeal pouch and so on. The origin of the lateral aberrant thyroids cannot be discussed here. A metastasizing adenoma is similarly explained as the spread of the adenoma within the confines of the thyro-thymic lymph system.

When these tumours invade vessels and metastases occur in bones then further confusion arises, because certain of these metastases have been found functionally active and to consist of normal thyroid tissue, or what appears to be normal thyroid tissue.

The classical case is that of von Eiselsberg, in which tetany (? cachexia strumipriva), following removal of a carcinomatous thyroid, was relieved when a secondary appeared in the sternum and reappeared when the sternal growth was excised.

Can a malignant thyroid produce a benign metastasis?

Can a benign thyroid produce a benign or malignant metastasis? I should think the answer is 'no' in both cases. Then why should such questions even arise and what is the reason for such a term as benign metastasizing goitre?

Return to the tumour confined within the organ of its origin. No invasion of lymph glands occur, but, even while the tumour in the thyroid is so small as to be overlooked, so that the gland is considered normal or so small as to be looked upon as a small benign adenoma, even

at that stage invasion of vessels may have occurred. Tissue emboli then are responsible for the production of secondaries and tissue emboli can reproduce *in toto* the form of the organ of their origin and furthermore such secondaries can show functional activity.

A normal thyroid, a colloid thyroid, a thyroid containing a small adenoma, or a thyroid containing a malignant adenoma, each has at some time been reported as having produced a metastasis consisting of normal thyroid tissue.

That a carcinomatous thyroid appears to produce a metastasis that has the appearance of normal thyroid tissue is recognized and explained by the French term of 'the return towards the normal'. The term 'the return towards the normal' simply describes what appears to be normal, but in reality neither the thyroid nor the metastasis are normal. These metastases, the result of tissue emboli implants, give a very different picture from the multiplying cellular seeds of a true carcinoma, which can never show functional activity, but that they are malignant and the product of a malignant tumour must be accepted.

This because 'the epithelial appearance of different benign adenomas, or different parts of the same adenoma, may vary so widely, and because malignant change may take place with so little alteration in the characters and arrangement of the epithelium. Neither the character of the cells, nor the mitoses, nor the structure of the vesicles admit of any definite conclusion as regards non-malignancy or malignancy. From a pathological standpoint the dividing line between benign and non-malignant tumours can probably be nowhere drawn with greater difficulty than just here'. These facts, together with the fact that secondary deposits retain the characters of the primary tumour and that both may retain specific glandular structures, explain why it was thought that a malignant tumour might give rise to a metastasis consisting of normal thyroid tissue.

Malignant adenomata make up 85 to 90 per cent of thyroid cancers and it would appear to be a matter of great difficulty, at least in some cases, for even an expert pathologist to decide whether a thyroid adenoma and its metastases are malignant or not. Little wonder then, that investigators had recourse to such anomalous names to describe what they found in such puzzling atypical cases.

We saw in dealing with thyroid dysfunction that we may be dealing with a stimulus which may be normal or abnormal, affecting a gland which may be normal, sub-efficient, or diseased.

Similarly, Dunhill suggests that it may be held that neoplasms of the thyroid are the result of a stimulus, which may be normal affecting a gland which is sub-efficient or diseased or the result of a stimulus so excessive as to be abnormal and amount to irritation.

MATERNITY- AND CHILD-WELFARE TRAINING

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A MATERNAL mortality of 200,000 per annum, stillbirths numbering 340,000 and the enormous sum of 2,859,797 deaths amongst children under five years of age—that is, 43 per cent of the total deaths registered yearly in India—is evidence enough, without elaboration, that the time has come for India to set herself seriously to a consideration of the problems raised by this excessive wastage of life and to the evolution of some progressive policy with regard to maternal welfare and child care. Deaths are only one aspect and perhaps not the major aspect of the problem. Cholera over the last few years has accounted for a yearly average of 225,187 deaths, a problem of similar magnitude so far as deaths are concerned, though occurring in a liable population four times as large, but cholera does not leave behind a disablement rate of 30–35 per cent, nor is its effect on the future generation comparable with the ravages caused in the family by the death or ill-health of the mother. The cholera problem is being tackled, but very little has yet been done for the protection of mothers and children.

The influence of the less tangible evils, instability of temperament and character, arising from maternal ignorance, mismanagement and neglect cannot be accurately assessed but there is abundant evidence of their importance in the history and international standing of the race, and no nation which values its good name and place amongst the world powers can longer neglect measures for the education of its mothers and the well-being of its children, the future directors of its destiny.

The child-welfare movement offers the most hopeful method of tackling the problem of reducing deaths and promoting health. It has proved its value over and over again in western countries and from small beginnings has extended its influence to include ante-natal care, the midwifery services, infant and child welfare proper and the nursery school. It has forged close links with the school medical service, and the executive officers, the doctor and the health visitor are not infrequently common to both services. The starting point of the movement is not important; the midwife may be first on the field, the health visitor, or the administrator. So long as the foundations are well and truly laid extension is possible in any direction. Up to the present India has been able to call to her aid the midwife and the health visitor, but the past history of the maternity- and child-welfare movement in India proves abundantly that something more is needed. It is widely recognized that no degree of excellence of administration can overcome the handicap imposed by

lack of skill and knowledge in the actual worker, but the converse, which is equally true, seems somehow to have escaped notice in this part of public health, and the services of skilled midwife and health visitor have often been rendered ineffective by misdirection, sometimes by the unenlightened enthusiasm of the philanthropist and often by the insatiability of the official body for figures and yet more figures. For instances of misdirection we have not far to look; in a large town in India there were 25 municipal midwives; in 1931 these women conducted 7,132 deliveries and attended 141 other cases who ultimately were delivered in hospital—a total of 7,273 cases. Each midwife therefore conducted 291 cases during the year. After allowance has been made for one weekly day off-duty and the yearly holiday of one month this works out at just over one delivery per day per midwife. Puerperal visits are paid for 10 days and the midwife will therefore in addition to one delivery visit 9 lying-in women. She is further required to pay 25 house-to-house visits daily to get in touch with the expectant mother. Confinements vary in duration and an average of 4 hours' attendance on any case is a very minimum estimate. Visits during the puerperium are for the purpose of attending to the local and general cleanliness and comfort of the mother, the establishment and management of breast feeding, the care and cleanliness of the baby and the general hygiene of the surroundings; no one can accomplish these duties satisfactorily in less than 30 minutes. Nine puerperal visits therefore means another 4½ hours duty daily. House-to-house visiting is an uneconomical way of doing ante-natal work. It wastes the midwife's time, gives a feeling of false security and is useless from a preventive viewpoint. Even if the midwife allows only 2 minutes per house she brings her total working day up to 9½ hours irrespective of time spent in travelling and in writing up her records. The times allowed have been reduced much below the ideal and even below the safe limit and yet the working day of the midwife is, on the face of it, almost a physical impossibility. It is made to function by the delegation of work which properly lies within the province of the midwife to the indigenous *dai* or the relatives, and so defeats the object of the service which is to make confinement safe and to raise the standard of health. Other examples of defective planning can be found in the distribution of milk at the milk kitchens, where breast feeding is discouraged by supplying milk to newborn infants, instead of to the nursing mother, and by bringing the supply to an end at the age of two years before the child is even firmly established on the ordinary defective adult dietary, or in the infant-welfare service, where the visits are discontinued when the child is three months old, just at the age when the results of maternal mismanagement and unhygienic habits are becoming manifest.

Enough has been said to illustrate the point that a special training is required for the medical officer in charge of maternity- and child-welfare schemes. Western countries have recognized this; the Society of Apothecaries instituted the degree of Master of Midwifery (M. M. S. A.) a few years ago and in March of this year the Society of Obstetricians and Gynaecologists decided to confer a diploma (D. O. O. G.) to post-graduates with special training in midwifery and gynaecology. The diploma in maternity and child welfare (D. M. C. W.) given by the Faculty of Tropical Medicine, Bengal, is on similar lines, but as will be seen from the brief outline given below it is more comprehensive and ensures a sound training on preventive medicine and public health practice.

The course for the diploma in maternity and child welfare at the All-India Institute of Hygiene is designed to meet one of the outstanding needs of India to-day, namely, for a trained body of medical women to reorganize existing welfare schemes, to formulate schemes suitable for rural as well as urban India, to organize and administer the work in larger districts and provinces, and to make the schemes effective by personal participation in the executive duties of the maternity- and child-welfare officer. The last qualification is by no means the least important. No one can successfully plan and organize who has not a thorough and lasting knowledge of the subject: this is gained only by practical personal experience of the duties and difficulties of the executive officer.

The aim of the course for the diploma in maternity and child welfare is therefore to give the student a thoroughly practical training in the administrative and clinical aspects of maternity and child welfare and school hygiene, and to make her sufficiently conversant with public health in general to fit into the complete scheme this fundamental and integral part.

The present training of the medical student in obstetrics is admittedly unsatisfactory; opportunities for the study of children's diseases and for the treatment of venereal diseases are very limited in most Indian Universities to-day and for these reasons post-graduate training in these subjects is included in the curriculum. The possession of the D. M. C. W. will be a valuable guide to local authorities in choosing a medical officer for their midwifery services because in selecting candidates for the diploma attention is paid to previous experiences in midwifery and diseases of children and on this foundation is superimposed an intensive post-graduate course in up-to-date methods.

Skill, experience, and judgment in midwifery and in the treatment of disease is however only half the equipment of the well-trained medical officer. Her outlook must be preventive. Preventive medicine is invading the medical curriculum, but still the bias of the graduate is towards the diagnosis and cure of disease; she is prepared to advise on ill-health, but rarely

to aid the mother of the healthy child to prevent disease or to guide her to make the most of the physical and mental endowments of her children; she can minister to the body but knows little of the 'motives and mechanisms' of the child's mind and rarely recognizes the environmental factors underlying anti-social behaviour or the psychological significance of widely different physical symptoms; she may or may not advocate conception control, but she is ill prepared to arouse in the parents a sense of responsibility for the nature and number of their offspring. In short the average doctor recognizes only disease, not degrees of health, she substitutes the easier 'bottle' for explanation and education, and leaves the general level of physical and mental health very much where it was before she began her ministrations. The diploma course is designed to correct this bias; it includes lectures on child development and management, child psychology, genetics, and school hygiene, and the welfare unit attached to the All-India Institute of Hygiene provides ample facilities in home, school and clinic for the practical application of theoretical knowledge. This part of the training is invaluable since from personal experience and practice alone come wisdom and understanding to the doctor, and lasting benefit to the community.

The further training for the diploma in maternity and child welfare lies along lines similar to those for the diploma in public health and classes in vital statistics and epidemiology, sanitary law and public health administration and general hygiene are held jointly for the two diplomas. For the former, however, emphasis is placed on the methods of surveying an area with regard to its need for midwives, maternity homes and hospitals, infant and child welfare, and school medical services, and on the organization and administration of effective schemes for maternal and child life protection.

The maternity and child-welfare movement has timed its birth in India under very unfavourable conditions, but there is little doubt that it has come to stay. There are already signs that the present period of quiescence will shortly be followed by a period of active growth. Enlightened authorities are even now asking themselves whether they are getting value for the money spent on treating established disease, or whether the time has not come for them to reorganize their schemes and to introduce a more positive policy towards health. The whole superstructure of public health is built on the foundations laid at and around birth, and in the interests of efficiency, economy and the well-being of the nation a sound maternity- and child-welfare service is vitally necessary. They labour in vain who labour to produce an A-1 nation if the basis, soundness of body, stability of character and alertness and vigour of mind, has not been well and truly laid in infancy and youth. The questioning of

to-day is the forerunner of the demand of tomorrow and the object of the diploma course in maternity and child welfare is to meet this demand for a body of trained medical women

fitted to take up executive or administrative posts in any scheme for safeguarding the mother's life and for conserving the child's birthright of health.

Medical News

FRANCE HONOURS BRITISH RESEARCH

THE President of the French Republic has paid a notable tribute to English medical and chemical research by conferring the honour of La Croix de Chevalier de la Légion d'Honneur upon Sir Henry Wellcome, LL.D., F.R.S., the Founder of The Wellcome Research Institution and its associated research laboratories and museums, in which are included The Bureau of Scientific Research, Physiological, Chemical and Entomological Research Laboratories, and The Museum of Medical Science and The Historical Medical Museum.

These research laboratories and museums, associated together in The Wellcome Research Institution, whose magnificent new building in the Euston Road, London, occupies a site having a frontage of 360 feet, have, by their original medical, chemical, physiological and historical researches contributed largely to international scientific knowledge, a fact which finds recognition in the honour bestowed upon the Founder by the Government of France.

BOMBAY MEDICAL COUNCIL

THE following extract from the summary of the proceedings of the meeting of the Bombay Medical Council held on the 5th February, 1934, is published for information:

The Council resumed consideration of the adjourned inquiry in the case of Mr. Motiram T. Ramchandani, M.B., B.S. (Bom.), of Station Road, Lucknow, in which he was charged as follows:—

That on or about the 9th May, 1932, without having previously had one Chahitey Lal under his treatment or observation, he gave him or some person on his behalf a certificate to the effect that the said Chahitey Lal was under his treatment from 29th February, 1932, to 3rd March, 1932, for malarial fever, which certificate was false to his knowledge and that he gave such certificate for the purpose of making it possible for the said Chahitey Lal to take up the plea of *alibi* in a murder case in which the said Chahitey Lal was one of the accused and that in relation thereto he had been guilty of infamous conduct in a professional respect.

The Council held that Mr. Ramchandani had been guilty of infamous conduct in a professional respect and was directed to remove Mr. Ramchandani from the Bombay Medical Register.

The Council resumed consideration of the adjourned inquiry in the case of Mr. N. K. Panse, L.C.R.S., of Kasba, Sholapur, in which he was charged as follows:—

That on or about the 13th April, 1932, he gave to one Mrs. Rukhminibai Balramdas Pujari or some person on her behalf a certificate to the effect that the said Mrs. Rukhminibai Balramdas Pujari was under his treatment from 3rd March, 1932, to 24th March, 1932, for neuritis of the ulnar nerve and that she was not in a position to attend to her duties as the pain was severe, which certificate was false to his knowledge and that he gave such certificate for the purpose of making it possible for the said Mrs. Rukhminibai Balramdas Pujari to prefer an appeal to the Assistant Sessions Judge, Sholapur, in connection with a suit which was dismissed for default by the Joint Sub-Judge, Sholapur, and that in relation thereto he had been guilty of infamous conduct in a professional respect.

The Council held that Mr. Panse had been guilty of infamous conduct in a professional respect and the Registrar was directed to remove Mr. Panse's name from the Bombay Medical Register.

The Council considered a motion made by a member that the meetings of the Council be thrown open to all who may apply to be present, excepting deliberations in penal cases, and it was resolved that registered medical practitioners up to a maximum of five may be allowed to be present provided that they state their reasons in writing to the Registrar why they wish to do so and obtain from him a ticket of admission.

The Council considered the case of Mr. S. P. Lulla, M.B., B.S. (Bom.), of Rampart Row, Karachi City, who had been summoned to appear before the Council to answer the following charges:—

(a) That he granted two vaccination certificates on or about 10th March, 1933, (1) one to Amir Mohamad and his wife Mst. Jawahar and (2) the other to Ali Asghar, Mst. Meryam, Nusrullah and Mst. Fatima, to the effect that they had been inoculated against small-pox and that they were fit to leave the Port (Karachi), while none of them had actually been vaccinated by him and they were unable, when inspected by the Port Health Officer, Basrah, to show any signs or marks of having been vaccinated and had, therefore, to be vaccinated at the Port Health Office, Margil, Basrah;

(b) That later he also granted another certificate, dated 17th March, 1933, to one Mr. Jacob Davidoff to the effect that he had been inoculated against pox and that he was fit to leave the Port but he had subsequently to be vaccinated by the Surgeon of S.S. 'Vasna' with fresh calf-lymph on 23rd March, 1933;

(c) That the certificates in question were, therefore, untrue, misleading or improper and that in relation thereto he was guilty of infamous conduct in a professional respect.

The Council held that Mr. Lulla had been guilty of infamous conduct in a professional respect and the Registrar was directed to remove Mr. Lulla's name from the Bombay Medical Register.

The Council considered a representation made by Mr. P. B. Dewasthale, M.B., B.S., of Igatpuri, that medical graduates when summoned to attend courts should be allowed II Class railway fare, and it was resolved that Government be addressed with a view to the High Court being moved to modify the rules so as to allow II Class fare to medical graduates for attending courts.

The Council next considered the application of Mr. B. H. Bhatt, M.B., B.S. (Bom.), of Nadiad, requesting that his name, which had been removed from the Bombay Medical Register under section 9 of the Bombay Medical Act, 1912, may be restored to the Register, and it was resolved that, before taking final decision in the matter, the opinion of the Advocate-General should be obtained as to the action which the Council can take in case it differs from the recommendation of the Executive Committee under rule 94 (vi) of the Rules of the Council.

The Council considered a reference from the Bombay Government forwarding an application from Mr. Heramba Nath Chatterji for permission to be registered under section 7 (3) of the Bombay Medical Act, 1912, and resolved that Government be informed that there is no proof that Mr. Chatterji was in practice in this

Presidency before the 25th day of June, 1912, and that he cannot, therefore, be granted permission to be registered under section 7 (3) of the Act.

The Council considered a motion made by a member of the Council for the amendment of the Code of Medical Ethics and it was resolved that the Code should be amended so as to require the avoidance by registered medical practitioners also of the following practices:—

Associating with foreign medical men who do not possess a medical qualification recognized for registration by the General Medical Council as an additional qualification.

Associating with medical agents of manufacturers whose sole object is to advertise products of particular manufacturers.

Publishing, or sanctioning the publication of, in lay papers, the subject or substance of lectures in the diagnosis or treatment of diseases to be delivered by them.

The Council considered a reference from the Bombay Government forwarding a representation from Mr. U. I. Bhatt, Sub-Assistant Surgeon, Municipal Dispensary, Seeghelatti, Shimoga (Mysore State), requesting reconsideration of his previous application for permission to be registered under section 7 (3) of the Bombay Medical Act, and it was resolved that Government should be informed that the Council adheres to the opinion previously expressed by it that the applicant was not practising in the Bombay Presidency prior to June 1912 but in South Kanara District, as stated by him in his original letter to Government, and that he cannot be given permission to be registered under section 7 (3) of the Act.

The following six members were elected to constitute the Executive Committee for the year 1934:—

Dr. D. A. D'Monte, M.D., Dr. G. V. Deshmukh, M.D., Mr. Mangaldas V. Melita, O.B.E., Dr. Rajabally V. Patel, M.D., Lieut.-Col. W. C. Spackman, I.M.S., Sir Nasarvanji Choksy, Kt., C.I.E.

AN ADDRESS, DELIVERED AT THE FOURTEENTH ANNUAL MEETING OF THE CENTRAL CO-OPERATIVE ANTIMALARIA SOCIETY HELD IN CALCUTTA IN FEBRUARY 1934, ON THE BIOLOGICAL CONTROL OF ANOPHELES IN BENGAL

By C. STRICKLAND, M.A., M.D.

*Professor of Entomology, Calcutta School of Tropical
Medicine*

It has been repeatedly shown that mosquito larvæ and, in fact, few aquatic insects of any sort can be found in the water of big rivers, which shows that certain elements in the terrain can be excluded from the scope of antimalarial work. Let me assume then that you have in any locality decided whence your trouble is coming.

Now for malaria prevention let me first lay it down as an axiom that it is better policy from the financial point of view to rely more upon measures that are of a permanent nature, if in the circumstances of the locality any are feasible, rather than upon those that are temporary, and the charges for which are constantly recurring. For instance let us suppose you can get the same results by draining a swamp at a cost of Rs. 1,000, as from spraying it with oil at a cost of the annual interest on Rs. 1,000; it would be better to adopt the former measure. Although this point of view dominates our everyday life, nevertheless the Far Eastern Association of Tropical Medicine considered it worth emphasizing and expressed it in a resolution at their Congress in Calcutta in 1927.

Now what measures of more permanent nature might be feasible to suit the conditions of Bengal?

Let us first see if Nature can assist us. I have often noticed that if people have any work to do they are

very glad to put it on to someone else's shoulders, particularly if no payment has to be made. So perhaps we can put some of our work on to Nature's broad shoulders and get out of paying for it. She is dumb and cannot complain; on the other hand if we oppose Nature we will assuredly have to spend a great deal of time and effort in combating her infinitely greater power and then we may perhaps fail. She is so immeasurably more powerful than puny Man that all your effort might be wasted if you try to oppose her. Let me give you an example; here is a stream bending and curving through a field. Here is a man and he cuts a channel through the field to straighten out the stream. He is opposing Nature and all his work will be wasted for the stream will flow through the longer course because it is obeying certain Laws of Nature. You see therefore that if you want to get Nature to do your work for you, you must study what she is doing. In Bengal that is extremely difficult; for instance what is Nature doing to the surface of the land, the formation of the delta, the changes in the courses of rivers and their depth, the formation of *bhils* and so on? And yet you must try to understand all about it if you do not want to imitate the man trying to cut a straight course for the streamlet.

The difficulty of the subject may be realized when you remember that all the eminent engineers who have written about it have had different points of view in their explanation of what is going on. Dr. Chatterjee's paper 'The Romance of the Rivers of the Gangetic Delta' is a fascinating account of the main features of the problem.

One thing that Nature is doing in Bengal, as it does all over the world, is nurturing the growth of jungle. Can that take any of our work off our shoulders? If you look for breeding places of anopheles that carry malaria you will probably find that they do not occur under jungle or dense shade.* It has been shown that there are some places in Bengal where jungle could perhaps be utilized for the control of mosquitoes. That it does exist in some places is evidence that it can exist anywhere and does not interfere with the struggle for existence of the ryot. Therefore, one measure that your workers can safely follow in the villages is to encourage the growth of jungle over all collections of water. The Forest Department of the Government that conserves the Bengal forests may likewise be asked by you to see that streams and other collections of water now under forest be not exposed by cutting down the forest over them.

If in this respect you oppose Nature, that is if you try to combat the growth of her jungle, not only would you have to pay for it, but in this case you would be actually making matters worse. Get Nature to work for you, imitate her, assist her, but do not oppose her.

Now another way in which we might get Nature to work for us for nothing is by the encouragement of the natural enemies of the mosquito. You know that in our world all living creatures are preying upon one another, mosquito larvæ eat algae, and fish eat mosquito larvæ, and big fish eat little fish, and so on.

I am becoming always more convinced that the distribution of mosquitoes depends more upon the distribution and prevalence of their natural enemies than upon physical conditions, whereas in the old days mosquito larvæ were described as 'pool-breeders', 'stream-breeders', and so on, as if the physical conditions of the water in which they bred were the most important factors. There are of course many creatures that prey upon mosquitoes both in their aquatic condition and in their adult state; water insects and fish

* That malaria-carrying anopheles do not usually live in jungle is not a new discovery in Assam as stated recently in the press. Though I preached it to the British Medical Association in Assam in 1923, it was made in the Malay States about 1915 and is referred to in an editorial article in the *Indian Journal of Medical Research*, 1916.

devour mosquito larvæ, and birds, bats and spiders the adults.

There is little doubt but that permanent collections of water like tanks are of less danger than temporary collections. Probably the reason is that in the latter mosquitoes lay their eggs and complete their development within a few days before their most dangerous natural enemies have had time to establish themselves and to breed freely enough to deal with them. Moreover temporary collections of water being, *ipso facto*, shallow, are unfavourable to bigger creatures like fish, and the very fact that permanent collections are not dangerous shows that it is the bigger of the natural enemies like fish that are of more importance in nature. Small natural enemies like blood-worms can indeed be established in shallow water as quickly as mosquito larvæ.

Now, with such little knowledge of this subject that we have got, what should you do? The principle to follow is to make things less favourable to mosquito larvæ and more favourable to their enemies. Water tidiness takes away protection from larvæ, and such measures as converting shallow places into deep ones, cutting away shelving edges to streams, tanks, etc., removing big fish periodically, make things more favourable to their enemies like little fish. Then what about putting fish in or cutting channels from rivers into tanks, etc. Don't waste your money on it. You know that Nature abhors a vacuum, and you can just as well expect a natural vacuum in an unclosed vessel as a natural breeding place for mosquitoes like a tank without fish. Darwin emphasized that where there is food for an animal there the animal will be found, and fish will be found naturally everywhere that they could survive if you put them there by hand. How do they get there? By the overflow of big streams or in the case of closed tanks by the spawn being transferred on the feet of wading birds. Therefore, again let Nature do your work for you and save your money and your strength, by not *putting* fish into such places by hand, but on the other hand by expending it on making the place more *suitable* for your fish.

It is right to mention here the question of overflow irrigation, because it appears that this measure acts by distributing all over the surface of the land vast numbers of the natural enemies of mosquitoes.

Such antimalarial measures as the utilization of jungle and of the natural enemies of the mosquitoes may be called biological methods because you utilize living processes.

You may also sometimes get Nature to do your work for you in a physical way. As I stated above, you can get Nature to distribute your fish over the surface of the land by the overflow of the rivers, and other physical methods, if feasible, are excellent. Drainage of swamps and wide expanses of water reduces the area available for mosquito-breeding and would make jungle-growing much less necessary; but in a flat country like Bengal drainage is very difficult. Filling up borrow-pits with earth is a perfect measure, because it abolishes water altogether. Another physical measure which I would like to mention is the filling up of *bhils* with silt as we have done in some Assam tea gardens. You have a *bhil* alongside a silt-laden stream at a higher level—you connect up the two and the silt-laden water enters the *bhil*, and the silt is deposited and levels up the *bhil*. It seems to me this measure might be used in Bengal.

The use of crude chemicals, as far as I know, is a challenge to Nature as well as being a constantly recurring charge, therefore for financial reasons not to be recommended. They are a challenge to Nature because they destroy the water creatures other than mosquito larvæ and oppose Nature's methods. Sometimes one cannot get on without them; for instance I am looking after a big oil field in Burma where for various reasons it is best to use oiling.

But whatever you do is going to be hard work. I see no royal road to the prevention of malaria in Bengal, not even overflow irrigation. This is not going to be easy, for you may be sure the zemindars would not have embanked their rivers if they were not going to be better off for it, and they therefore no more want 'overflow' now than they did in the past. Are you going to oppose Man who after all is an important element in Nature? Further even if there were no zemindari embankments you would still have the natural embankments thrown up by rivers. Are you going to oppose Nature by throwing them down? Leaving overflow irrigation aside for the moment, I would summarize by saying, first find out in each locality what species of anopheles is causing you trouble, secondly, find out its main sources (and this should be rather by a malaria survey than by a mosquito survey), and, thirdly, deal with it either by the use of jungle, first draining the land as far as possible or by a combination of water tidiness, and making the breeding places as suitable as possible in many ways for small fish, or by the use of physical methods only, like drainage; or silting may be considered.

Current Topics

The Serum Treatment of Lobar Pneumonia

A Report of the Therapeutic Trials Committee of the Medical Research Council

(Abstracted from the *Lancet*, 10th February, 1934, p. 290)

DURING the last three years the Medical Research Council have assisted an inquiry at different centres in Great Britain into the therapeutic value of specific sera for lobar pneumonia; following the great development of similar work in the United States. When the Council appointed a standing Therapeutic Trials Committee in 1931, the investigation was placed under the control of that committee, and following is the summary of the evidence obtained:—

(1) Concentrated antiserum for type I pneumococcus reduced the fatality in type I cases of lobar pneumonia in adults between the ages of 20 and 40; from the total figures of the present inquiry, however, the treatment appeared to have little, if any, effect on

the fatality in older patients (aged 40–60). The treatment seemed definitely to reduce the average duration of fever and illness in patients who recovered, and there was a suggestion that it also decreased the liability to empyema among survivors.

(2) Similar effects were seen when type II antiserum was used for cases of type II lobar pneumonia.

(3) Immediate serum reactions of a dangerous nature were rarely seen in the present series of cases, except that one or two batches of a particular concentrated mixed serum did cause rigors and collapse at both the centres where they were used. There were no unpleasant late anaphylactic results with the concentrated serum. On the whole a good serum seemed to be devoid of disturbing effects on the patient, and on these grounds there need be no hesitation in the use of the treatment.

(4) The benefits from serum are not so emphatic as to make it desirable that all severe cases of lobar pneumonia, irrespective of the type of the infecting pneumococcus, should be treated with type I and type II antiserum on the chance that they might

belong to a type which is favourably influenced. Moreover, the special technique required for repeated intravenous injections, and the cost of the serum make the treatment unsuitable for universal application.

Each case must be typed as soon as possible, so that the appropriate serum may be used in the optimum dose; the use of the serum is not recommended except under conditions where typing of the pneumococcus can be obtained.

(5) If accurate typing of the sputum can be done in five or six hours, serum should be withheld until the type is known, and then a dose of 20,000 Felton units of the specific serum given. But if more time is required for the typing, then a preliminary dose of 20,000 Felton units type I, together with 20,000 units type II, should be given; and the specific type serum, either I or II alone, continued when the nature of the infection is known.

Treatment is continued by injection of 20,000 units at a time, twice a day with approximately an eight-hour interval. Usually a total dosage of 80,000 units, with variation from 50,000 to 120,000 units, of the single specific serum is required, type II cases on the whole needing a larger dosage than type I. If no obvious clinical improvement occurs in the first 48 hours of serum treatment, it is probably useless to continue with it.

(6) The serum should be given intravenously. There is no satisfactory preliminary test for any peculiar sensitiveness of the patient to horse serum. The first injection should therefore be made cautiously and slowly, 1.0 c.cm. being introduced into the vein in a minute or two and the total being injected in 10 or 15 minutes. Adrenaline solution 1/1000 must be ready beforehand, and 0.5 or 1.0 c.cm. of this should at once be injected *subcutaneously*, if the patient reacts unfavourably with collapse and failure of the pulse or urgent dyspnoea. Second and subsequent injections of serum may be given with less precaution.

In addition to anaphylactic sensitiveness of the individual, there is the chance that the serum supplied by the manufacturer may contain protein substances which are toxic to most individuals, as occurred in a few batches used in the present inquiry. To safeguard against this, 1.0 c.cm. of the serum may be injected intravenously, and the remainder of the dose slowly injected half an hour later, provided that no untoward symptoms have occurred. This precaution is unnecessary if the batch of serum is known to be harmless, either from other experience, or because the manufacturers state that it has already been tested from this point of view.

(7) No data were collected in this inquiry with regard to the use of the serum in children, or in patients over the age of 60, or in cases of broncho-pneumonia.

Blood Transfusion

By NORMAN HILL, M.D., M.R.C.P.

(From the *Medical Press and Circular Supplement*, 24th January, 1934, p. 14)

COMPARATIVELY few years ago a blood transfusion was regarded as a procedure only to be undertaken by a specialist in that particular branch of medicine, but at the present time transfusions are being given daily by house physicians and house surgeons throughout the country. As the resident medical officers of to-day are the practitioners of to-morrow, it follows that transfusions have passed out of the hands of the specialist, and can be undertaken by any practitioner familiar with the technique. The methods here described do not attempt to include all the various ways of giving blood, but they do claim to be both simple and efficient.

BLOOD GROUPS

It has been found that blood indiscriminately transferred from donor to recipient may produce in the

latter dangerous and even fatal symptoms, so that the suitability of the donor's blood must always be ascertained before commencing a transfusion. These symptoms, which include precordial pain, urticaria, collapse, and sometimes death, are due to the fact that in some cases the corpuscles of the donor are agglutinated by the serum of the recipient, and if this takes place that particular donor should on no account be used.

There are four main blood groups, described as 1, 2, 3, 4. Group 1 is known as the universal recipient, as he can receive blood with safety from his own group, and also from groups 2, 3 and 4. Group 4 is known as the universal donor as he can give blood to his own group and also to groups 1, 2 and 3. All groups may receive blood from similar groups, or from group 4. Group 4 can only receive blood from group 4. The most common groups are 2 and 4. In order to ascertain the group to which any particular individual belongs, it is necessary to procure a small quantity of group 2 and group 3 sera: these are usually supplied ready for use in sealed capillary tubes. The serum is then expressed on to a white porcelain dish—a household plate will serve—previously marked so that the groups will not be confused. A drop of blood of the unknown group is then obtained, and about as much as will fill the eye of a large needle is mixed with the serum. It is a good thing to use two needles using the eye of one for group 2 serum and the eye of the other for group 3, and by this means there is no possibility of mixing even a small quantity of the sera. The dish should be gently agitated so as to mix thoroughly the sera and corpuscles. If agglutination takes place the appearance is that of a sprinkling of cayenne pepper, whilst if there is no agglutination, the two drops remain as they started after the original mixing. A hand lens may be used for observing this, but it is usually unnecessary, agglutination being obvious to the naked eye. If agglutination should occur it will be seen in the first minute or two if fresh active serum is used, and the mixtures need never be watched for longer than five minutes.

It is important to note that if tubes of the known sera be kept for any length of time they should be stored in an ice chest, otherwise they tend to deteriorate, and fallacious readings may result if the tubes have been kept at ordinary room temperature. Reference is then made to the accompanying table and the group determined.

Corpuscles	Serum			
	1	2	3	4
1	—	+	+	+
2	—	—	+	+
3	—	+	—	+
4	—	—	—	—

For example, if there is agglutination in both drops, then the blood is group 1; if there is no agglutination in the group 2 serum, but there is in the group 3, then the blood belongs to group 2.

If no known sera are available, then the patient and donor cannot be grouped, but a direct agglutination test may be carried out in order to discover whether the particular donor is suitable for the patient, even though neither blood group may be known. This is performed by taking a little blood from the patient and obtaining the serum from it. This may be done either by withdrawing about 1 c.cm. of blood and placing it in a narrow tube, when the serum will gradually separate; or by filling a capillary tube with blood, and after coagulation a string clot can be pulled out, leaving sufficient serum for the test.

The test is carried out in exactly the same manner as described under grouping, the drop of the patient's serum being mixed with the blood of the donor. If no agglutination takes place, then that donor is suitable for the patient.

When giving a transfusion to a patient with one of the 'blood diseases' (pernicious anaemia, etc.) it is

always safer, even though the groups of both donor and recipient are known, to do a direct agglutination in addition, as in practice these 'anæmic' bloods do not always behave as in theory they should do, and agglutination occasionally occurs in groups which should be quite compatible.

THE TRANSFUSION (CITRATE METHOD)

The most simple method of all is to administer the blood in exactly the same manner as an intravenous saline is given, and with this method a minimum of apparatus is required.

The essentials are: a flask graduated up to 1,000 c.cm., a funnel, some rubber tubing, glass connections, a clip, and needles. In order that the blood may not coagulate, it must be received direct into an anticoagulant, and the flask, sterilized either in the autoclave or by boiling, must be prepared in advance. Into the flask is introduced 50-100 c.cm. of sterile normal saline at about 100°F., to which is added the necessary quantity of sodium citrate. This quantity naturally varies with the amount of blood it is proposed to take: 1 gm. of citrate should be sufficient for 400 c.cm. of blood, though it is probably safer to add rather more than this. The citrate can be obtained from many chemists made up in solution, a sterile ampoule containing 1 gm. of citrate in 3 c.cm. The flask should now be corked, and the first stage of the transfusion may be started.

The donor should preferably be a young healthy male with prominent veins, and only those with no taint of venereal disease, malaria, etc., should be used. He should be lying on a couch or bed with the arm selected on the edge. A tourniquet or better still a sphygmomanometer, should be placed round the arm well above the region of the antecubital fossa, and the armlet inflated until the dial reads about 80 mm. It is of the utmost importance that the arm be not compressed too tightly, or else the blood will not flow, hence the advantage of the sphygmomanometer over the tourniquet. When pressure is put on the arm the veins in the region of the bend of the elbow, the median cephalic, and the median basilic will become prominent, and can be made even more so by the donor clenching his fist.

The needle—and the type known as a French's needle is recommended—is now introduced into the vein in an upward direction, and if this manœuvre is performed successfully, blood will be seen through the glass connector coming down the tube into the flask. The latter should be held low down preferably by an assistant, and gently rotated in order to mix the blood and citrate together. As the blood flows the donor should clench and unclench his fist at intervals, about twelve to fourteen times per minute, and this pumps the blood from his vein into the flask. The assistant should be most careful not to put any tension on the tube attached to the flask, as if this occurs the needle may be pulled out of the vein, and the latter rendered useless for that particular transfusion. The blood should flow in a fairly rapid stream, accentuated every time the donor clenches his fist and unless the blood does flow rapidly there is danger of coagulation between the needle and the flask. If blood ceases to flow, or the rate suddenly decreases, a little gentle manipulation of the needle, such as a very slight withdrawal, will usually start the stream flowing again.

In order to prevent coagulation it has been suggested that sterile paraffin should be run through the tubing before taking blood, but I have never found this procedure necessary. As soon as the requisite amount of blood has been obtained the armlet is deflated, the sphygmomanometer removed, the needle withdrawn, a wad of sterile wool placed over the puncture, and the donor made to flex his elbow as far as possible. He should then be given half to one pint of hot coffee, and made to rest for an hour, after which he may go home. During these attentions to the donor the flask

of blood should be placed in a vessel containing warm water, so that the blood will not cool.

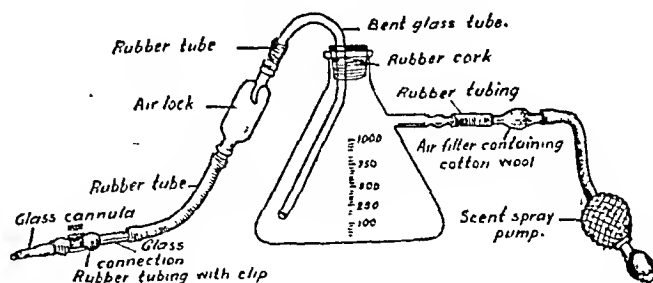
Some controversy has taken place as to whether a local anæsthetic should be given to the donor. If the needle is as sharp as it ought to be, this is seldom necessary, and most donors whom I have asked prefer to do without it. One of the objections to a local anæsthetic is that when the vein is not easily seen it may be masked altogether by the injection. Some operators give a small bleb of anæsthetic intradermally, and make a tiny incision in the skin, just large enough to take the needle, and this avoids the force sometimes necessary in introducing the needle through the skin. It should never be necessary to cut down upon the vein of the donor, and most bodies supplying donors, such as the London Blood Transfusion Service, rightly insist that this shall not be done. It cannot be emphasized too strongly that the needle should be sharp, and I have seen more than one transfusion ruined as a result of a blunt needle tearing the vein and causing a hæmatoma, which renders the vein useless for some time.

Everything is now ready for the administration of the blood to the recipient. If one of his veins is visible the blood can be given through a needle inserted into the vein, but if the vein cannot be clearly made out, a condition which obtains in many bloodless subjects, it must be dissected out, and a glass cannula inserted. If the intravenous needle is used, a tourniquet may be applied above the vein in order to render it more distinct; as soon as the needle is inserted the tourniquet should be removed. The funnel and rubber tubing, including the needle, should now be filled with warm sterile normal saline until the latter is visible at the lowest part of the funnel, and a clip applied at the needle-end. The tubing is then gently massaged in order to expel any air bubbles, which will come to the surface of the saline showing in the funnel.

The needle or cannula is now introduced into the vein, and the warmed blood gently poured down the side of the funnel until the latter is full, the clip released, and the funnel elevated about twenty-four to thirty inches, when the blood flows into the vein by gravity. Towards the end of the transfusion the remaining blood may be somewhat 'frothy' and this froth must on no account be introduced into the vein, so that the injection should be stopped by tightening the clip before the froth has left the funnel. An assistant should be always be present, as it is most difficult to carry this out single-handed; it is essential for one to keep the needle in the vein of both donor and recipient as the slightest movement may dislodge it and cause failure.

Within a few hours of transfusion by the citrate method the recipient may have a rigor and high temperature. This is of short duration, and I have never seen harm result, unpleasant though it may be for the patient. It seems to be more common in those cases suffering from a 'blood disease' than in the purely surgical cases.

Flask fitted for giving blood.



Another method of giving citrated blood is by pumping the blood direct from the flask, into which it is received, through an airlock into the vein of the recipient. The apparatus required consists of a stout graduated glass flask with side-piece, rubber corks, air

filter, an airlock, glass tubing and glass connectors, rubber tubing and clip. In addition, a pump, scent spray type, and an evacuator are required.

The blood is taken from the donor in exactly the same way as has already been described. The cork and tubing used during the taking of blood is now removed, and the cork with the bent glass tube, to which is attached the airlock, tubing, and cannula, is inserted in its place.

The tubing is filled with warm sterile saline up to the top of the airlock, and the clip tightened; this can easily be done by attaching the evacuator to the air filter, and gently squeezing the needle meanwhile being dipped in the saline solution. This procedure can be done whilst the apparatus is being prepared, as once the clip has been tightened the cork can be removed from the flask, and none of the saline will escape when it is laid aside. The evacuator is now removed, the pump substituted, and all is ready to start. Once the needle or cannula is in the vein, the clip is loosened, and pumping started. As the blood flows over into the airlock, a certain amount of the saline in the latter is displaced by the air contained in the bent glass tube, but after that the blood level remains about the middle of the airlock until the transfusion is finished. When the last of the blood is going in, this level in the airlock begins to fall, and at that point the clip should be tightened, and the transfusion ended. In the use of this apparatus there are two practical points which are of importance; firstly, the cork should either be tied on to the flask, or held firmly in by an assistant when the blood is being pumped in; and, secondly, it is advisable to secure the rubber tubing to the glass by means of some soft copper wire, as after the tubing has stretched leakage may take place at these joints. The advantages of this method are that it is more easy to work single-handed than the funnel method, and that the blood is never exposed to the air.

Other methods of giving blood usually require more complicated and more expensive apparatus, and are not so suited to the occasional transfusion which may have to be performed by the practitioner. These include the giving of whole blood, and defibrinated blood.

INDICATIONS

The indications for blood transfusion are many and varied, but can be divided roughly into surgical and medical.

Surgical.—The chief indication is hæmorrhage, and transfusion may be done either simply to make up for blood lost accidentally, or to enable the surgeon to operate on a bloodless patient. If given for the latter cause, it may be done before, during or after operation, and in very severe cases may be performed in all three periods. There is no doubt that transfusion has enabled surgeons to operate successfully on many cases in which, without it, operative measures would have proved fatal.

Medical.—Pernicious anæmia. Before the introduction of liver therapy, transfusion was almost a routine during some period of this disease. At the present time it is almost unnecessary except in those cases which are moribund when first seen. Such patients are often unable to take food, and an initial transfusion is the most rapid method of restoring them to normal health. Severe anæmias of the pernicious type which do not respond to liver or hog's stomach may be benefited permanently by a transfusion.

Purpura.—When excessive bleeding has taken place, transfusion may be a life-saving measure. It is almost always necessary before splenectomy in those cases of essential thrombocytopenic purpura hæmorrhagica.

Hæmophilia.—Transfusions every few months are said to benefit these cases. It should always be done prior to any possible operative measures.

Leukæmia.—May be done as symptomatic treatment. It never does any lasting good.

Hæmatemesis and melana from peptic ulcers.—In severe cases transfusion is recommended, even though

no surgical interference is anticipated. The idea that the introduction of fluid into the circulation will raise the blood pressure and restart the bleeding is not borne out in practice.

Ulcerative colitis.—Severe cases are undernourished and anæmic, and a blood transfusion, repeated if necessary, is often the turning point in their illness, and should always be given if they do not respond readily to the usual treatment.

Hæmorrhage in the newly born.—Transfusion often is the only remedy, and should always be done. Blood may be taken (5-10 c.cm.) direct from a parent's vein, and injected intramuscularly into the infant, and repeated in a few hours. If this is done rapidly clotting will not occur. Given thus, the blood need not be grouped.

Marasmus.—Good results have been reported from transfusions in this condition, though, personally, I have never seen them.

Finally, as regards the quantity of blood that should be injected, there is no hard-and-fast rule, and it must be left largely to the discretion of the operator. Five hundred c.cm. is an average amount for an adult to receive. If it is desired to inject very large quantities, it is better to give repeated transfusions than one enormous one.

Treatment of Decubitus with Tannic Acid

By EARL O. LATIMER, M.D.

(From the *Journal of the American Medical Association*, Vol. 102, 10th March, 1934, p. 751)

DECUBITUS, or pressure sore, is the result of local impaired nutrition, frequently in a person whose tissues have a lowered resistance because of age, disease, injury or nerve involvement. Such lesions are initiated by pressure and often aided by some slight injury or by irritation from urine, feces or perspiration. While the lesion often occurs in paralysed parts, it is by no means limited to patients with nerve involvement. The soft tissues over bony prominences are the common location of these ulcers; but with the widespread use of casts, splints and skin traction few parts of the body surface are exempt. Pressure produces a local ischæmia with subsequent thrombosis, death of tissue and ulcer formation.

Prophylaxis is the ideal procedure. Such measures as frequently changing the position of the patient, massage, dusting powders including lead tannate, cleanliness and protection of susceptible parts are of the utmost importance. Air cushions, rubber rings and pads aid in relieving pressure on the skin overlying bony prominences. Too much emphasis cannot be placed on the proper fitting of casts and splints and the careful application of skin traction. The mere removal of pressure from an involved region does not necessarily prevent the continued development or extension of the lesion. Not infrequently decubitus develops in spite of prophylactic measures. This is especially true of patients with cord lesions and bed-ridden, aged, emaciated and diabetic patients.

Once the lesion has developed, the recommended local treatments are numerous. A few therapeutic measures advocated are ointment of zinc oxide, scarlet, red ointment, silver nitrate solution, ultra-violet rays, sunlight, dry heat and excision of the slough. More recently, sulphosalicylic acid and thiocresol have been recommended. The sulphur-containing radical is believed to stimulate epithelial growth. In severe cases and in extremely emaciated patients the continuous water bath has been used. Treatment to improve the general condition of the patient is important.

The gross similarity of decubitus to certain burns suggested the rationale of treating suitable lesions with tannic acid. Bligh treated an abrasion with tannic acid and Maddock used it to treat the surface from which Ollier-Thiersch grafts were removed.

Chapter II deals with sympathectomy for disorders of the circulation. The most interesting feature is the selection of cases suitable for the operation. The various tests for this purpose have been discussed in detail. Some of them require special instruments and appliances.

As regards periarterial sympathectomy the reviewer also is of opinion that though it has been given up nowadays as anatomically and physiologically unsound, it certainly relieves the patients of the severe pain which makes them pass sleepless nights for months together, helps in limiting the spread of gangrene by the formation of a definite line of demarcation, and accelerates healing of chronic ulcers of the leg. But unfortunately its effects do not last for more than three weeks.

A good account of cervical and lumbar ganglionectomy is given and is of great value to surgeons who have some idea of the anatomy of the parts. For cervical ganglionectomy the anterior route is always preferred by the reviewer as it is really a piece of fine dissection without practically any bleeding.

Chapter III deals with sympathectomy for disorders of the visceral motor mechanism. The different views about peristalsis have been discussed and all the recent work on the nerve supply of the intestines has been incorporated. Megacolon and its operative treatment have been dealt with.

The book is well illustrated. Most of the illustrations have been borrowed from different journals, especially the *British Journal of Surgery*. The book will be of immense value as full references are given at the end of each chapter. It is good reading and may be read and re-read with much profit. It is well printed on good paper.

We should like to see another edition of this book in the near future and hope that further work by the authors on this line will be embodied.

D. C. C.

BRIGHT'S DISEASE: A CLINICAL HANDBOOK FOR PRACTITIONERS AND SENIOR STUDENTS.—By J. Norman Crulokshank, M.C., M.D., D.Sc., F.R.F.P.S. (Glas.), M.R.C.P. (Lond.). 1933. E. and S. Livingstone, Edinburgh. Pp. x plus 208. Obtainable from Messrs. Butterworth and Co. (India), Ltd., Calcutta. Price, Rs. 7-14

NOTWITHSTANDING the constant research and much discussion on the subject of nephritis, the classifications of this disease are not always well balanced, and the different schools of thought have, from time to time, put forward arguments in their defence, which are nearly always more eloquent than plausible. From among the mass of literature on the subject the author has tried to provide practitioners and students with a clear view of the nature of Bright's disease, discussed from a clinical point of view.

The book opens with a chapter on general consideration regarding the normal functions of the kidney. With the idea of studying the functional abnormalities on scientific lines, the author has devoted much attention to the consideration of the associated structural changes—an attempt which is rational and helpful for it furnishes the readers with a secure basis for a clear conception of the disease.

In connection with the classification of the types of Bright's disease, the author has followed the German school, particularly the work of Volhard and Fahr, and in the preface he has acknowledged his gratitude to Professor Fahr for giving him access to his collections of histological preparations. From a clinical point of view it is recognized that most cases of Bright's disease have mixed lesions and it is very difficult to lay down a clear-cut line of demarcation between the different types. On a rough basis of the different types of structural changes in the kidney which gives rise to a recognizable clinical syndrome, and fitting in as closely as possible with the modern knowledge of pathogenesis and symptomatology, the author classifies the disease

as being of three main types: (a) an exudative or 'haemorrhagic' group; (b) a degenerative group, and (c) a vascular or ischaemic group. These types are rarely seen in pure form except in their initial stage, and are not meant to be a guide to the histopathology of the kidney.

While the author has dealt elaborately with the description of morbid changes in the kidney, it is disappointing to find that he has not given any illustration of the main histological appearance, which would have been of great help to students of clinical medicine. The treatment of the various forms of Bright's disease has been considered fully in a separate chapter, and the diet schemes given are very helpful. The chapter on oedema contains a critical survey of the various factors concerned and the conclusions drawn at the end of the chapter are useful. In the chapter on uraemia, the author has not brought out a clear distinction between the . . . of terminal renal failure and that . . . cerebral manifestation of hypertension. In the appendix, the technical details of some methods employed for estimating renal functional efficiency are given, while in a previous chapter the author has given a warning regarding the limitations of such laboratory methods.

The book is written in a clear style and will help and interest the medical practitioners in this country.

R. N. C.

CLINICAL INVESTIGATION OF CARDIOVASCULAR FUNCTION.—By V. Pachon and R. Fabre. Translated by J. F. Halls Dally, M.A., M.D. (Cantab.), M.R.C.P. (Lond.). 1934. Kegan Paul, Trench, Trubner and Co., Ltd., London. Pp. xl plus 252. Illustrated. Price, 15s.

This volume is the result of many years' experience of the joint authors. Science is ever progressing and the old methods are gradually giving place to the new. The investigation of cardiovascular functions is a difficult and complex affair, and the old methods of inspection, palpation, auscultation, etc., by the unaided senses are not complete in themselves, and do not satisfy present-day clinicians. The newer methods have brought to light many facts hitherto unknown and have furnished valuable information regarding the working of this system.

The book is divided into two parts. The first part deals with the principles for investigating the cardiac function proper and the deviation occurring in various diseased states. The second part deals with the methods investigating the condition of the vessels and the blood. In the opening chapter, the authors have described the principles of cardiography and its clinical interpretations in various pathological states of the valves, myocardium and cardiac dysfunction. The method of functional exploration of the right side of the heart in normal and pathological states has been clearly dealt with in the chapter on jugular phlebography. The chapter on electrocardiography is brief in comparison with the importance of the subject, but is clear and concise. The method of diagnosing heart disease by radiograms of the component parts of the organ . . . of recent years and the chapter on . . . numerous graphical illustrations will be of great practical value to the cardiologist. The inclusion of the recent oscillatory method with other methods of sphygmomanometry for clinical determination of arterial pressure will be helpful to the clinician. The description of the oscillogram and its working is comprehensive and clear. The problem of hypertension has been attracting the attention of the profession and the chapter on the variations of arterial pressure deals clearly with various factors responsible for such variations in health and disease. The chapters on functional investigation of capillary circulation by capillaroscopy and viscosimeter are also interesting. The concluding chapter dealing with the classical functional tests for investigating the nervous

control of the heart and the vasomotor system on the one hand and assessing the degree of circulatory sufficiency or insufficiency on the other are of great value.

The English-reading public are indebted to Dr. Dally for translating this book which will not only be useful to the clinician, but also to the research worker in this branch. The book should form part of the library of all cardiologists and practitioners interested in the subject.

R. N. C.

A TREATISE ON DISEASES IN GENERAL PRACTICE OF ADULTS AND CHILDREN IN CEYLON.—By B. S. Jayawardene, L.R.C.P. & S. (Edn.), L.F.P.S. (Glas.), L.M.S. (Ceylon). Parts I and II. 1933. Published by H. W. Cave and Co. (Colombo), Ceylon. Pp. 407. Price, Rs. 4

This book is intended to be a notebook for a qualified doctor of the sub-assistant-surgeon class rather than a systematic treatise for the use of students. The title is therefore not a very good one. Further, the subject is general diseases, seen from the point of view of the doctor in Ceylon, and not diseases peculiar to Ceylon, as the title might lead one to expect. We mention this because we think that the doctor in India may be inclined to pass this book over because its title suggests only local interest, whereas actually he will find in it information that is equally applicable in most parts of India.

The first half of the book is really a series of leaflets that the author has written for his patients and has at times distributed to them; the language is popular, and the subject is special hygiene. The chapters are entitled 'Prevention of.....' some disease or group of diseases, e.g., venereal disease, typhoid, vitamin deficiency.

The second part of the book deals with treatment of various diseases under their separate headings, e.g., malaria, tuberculosis, amebiasis. The notebook style of writing with numerous headings and terse sentences is maintained throughout. The information is on the whole very sound and the authority for many of the statements is given. The book is unfortunately marred by a number of misprints, some of which are of a serious nature, as for example on page 301 the heading 'macrocytic' should obviously be 'microcytic'.

It is a cheap book, and we can say with confidence that readers of the sub-assistant-surgeon class will find much in it that will help them in their practice.

CHRONIC NASAL SINUSITIS AND ITS RELATION TO GENERAL MEDICINE. (Chronic Sinusitis and Systemic Sepsis).—By P. Watson-Williams. Second Edition. 1933. John Wright and Sons, Ltd., Bristol. Pp. xx plus 262. Illustrated. Price, 15s.

MR. PATRICK WATSON-WILLIAMS has been the first to write a book dealing with this highly interesting subject, the systemic effects of nasal sinus infections. That he has done this well there is no doubt; the author admirably traces the relationship to general medicine of sinus disease. This relationship, though always recognized vaguely before, has never been more forcibly put before the medical profession. To the general practitioner the book is of special value as it puts before him the various conditions that sinus infections may be responsible for, and to a specialist, a very comprehensive account is given of the author's 'exploration-suction' technique in the diagnosis of infected sinuses and the operative procedures for their cure.

I feel confident that both these classes of medical men will find much to learn from a perusal of its pages.

N. J. J.

CALCIUM METABOLISM AND CALCIUM THERAPY.—By Abraham Cantarow, M.D. Second Edition. 1933. Henry Kimpton, London. Pp. xii plus 252. Price, 12s. 6d.

CALCIUM compounds are extensively used in therapeutics and during recent years a large amount of

work, both clinical and experimental, has been done and literature has accumulated. Dr. Cantarow has had an excellent opportunity of studying this difficult subject and has placed before the reader in a lucid and concise manner, the functions of calcium in the organism and the present position of calcium in therapeutics.

The book is divided into three parts: Part I deals with calcium requirement and excretion, blood calcium and functions of calcium in the body. In this part he has also dealt with the physico-chemical side of the subject. In Part II, disorders of calcium metabolism have been described, and the subject of parathyroid hormone and the indications and limitation of calcium therapy have been discussed. In the chapter on disturbances of blood calcium level and partition, the author has exhaustively dealt with the conditions of hypocalcaemia and hypercalcaemia. Part III deals in detail with the subject of calcium therapy by the oral, subcutaneous, intramuscular and intravenous routes. A chapter has also been devoted to hypoparathyroidism and tetany in which the author has described the incidence of the disease in infants and other conditions where tetany is only a symptom. The non-specific calcium therapy in dental caries, pregnancy, milk fever in cattle, eclampsia, acute hepatic insufficiency, jaundice, oedema, etc., has been fully discussed in the last chapter.

The book is well written and is a useful contribution to the literature. It will appeal both to the general reader and the research worker. The publishers are to be congratulated on the excellent get-up of the book.

R. N. C.

RHEUMATISM IN GENERAL PRACTICE: A CLINICAL STUDY.—By M. B. Ray, D.S.O., M.D. (Edn.). 1934. H. K. Lewis and Co., Ltd., London. Pp. viii plus 404, with 6 plates. Price, 16s.

THIS attractive volume gives a wide survey of the conditions belonging to the group of rheumatic diseases, from the aetiological, pathological, clinical and therapeutic view-points. Lord Horder in his foreword has expressed the opinion that this is the best book on rheumatism in the English language and in this we are inclined to agree.

The opening chapter of the book deals with the physiology of the skin, heat regulation, diathesis and the various adaptive functions of the body. The idea of enumerating these details is good, and it is superfluous to add that the preliminary conception of the various factors at work in the production of the disease is of fundamental importance and essential to the general practitioner before he can arrive at a proper appreciation of the disease. In the next chapters the author deals with acute and subacute rheumatism and rheumatism in children. He has taken, *seriatim*, the various conditions such as chorea, myocarditis, pericarditis and endocarditis, and discusses their causation and pathology in a simple and concise manner. The subcutaneous nodules and joint pains form *inter alia* an interesting survey and the chapter concludes with a useful reference to their treatment, which will repay careful perusal. The inclusion of Still's disease in this section is perhaps not a happy one; it is essentially a manifestation of rheumatoid arthritis in young subjects, the general enlargement of the glands and of the spleen is a peculiarity of the age of the subject and not of the disease. The chapters on fibrositis and arthritis are well written and give a comprehensive idea of the various manifestations of these reactions. The reviewer agrees with the author in dealing with rheumatoid arthritis as a separate clinical entity. Then follow chapters on treatment dealing with diet, physical methods, manipulation, baths, actinotherapy, orthopaedics, spa and climatic treatment. These chapters will be of special interest to the practitioner with a clear description of treatment which can be easily carried out even at home. The tone is stimulating and encourages the practitioner to attack rheumatic disease with some hope of success.

The volume is divided into two parts. The first part deals with the disease in general, while the second part treats of the rheumatic affections considered regionally. This arrangement is of great help from the view-point of differential diagnosis. The anatomical notes are also of great help to the reader, but the short notes on treatment appear to be redundant and somewhat out of place.

The arrangement of the book on the whole is admirable. In view of the fact that rheumatic affection has a wide incidence and has assumed a large proportion in the daily work of every practitioner, the book can be warmly recommended to medical practitioners. A practical solution of most of the difficulties of diagnosis and treatment is offered with an enthusiasm which is essential in a field that has hitherto proved for many one of disappointment and failure.

The get-up of the book is excellent, the paragraphing and clear headings make reference easy. The reproduction of the x-ray photographs and diagrams are of real assistance in diagnosis.

R. N. C.

CLINICAL TOXICOLOGY: MODERN METHODS IN THE DIAGNOSIS AND TREATMENT OF POISONING.—By Erich Leschke. Translated by C. P. Stewart, M.Sc., Ph.D., and O. Dorrer, Ph.D. 1934. J. and A. Churchill, London. Pp. viii plus 346, with 25 illustrations. Price, 15s.

THE book under review is an English translation of a treatise on the modern methods in the diagnosis and treatment of poisoning, written in German by Professor Leschke of the Berlin University. Both in India and Europe cases of poisoning, suicidal and homicidal, are on the increase. The ever-increasing use of poisons in industry, the increasing number of suicides and homicides with poisons due to world-wide social, political and economic upheaval which has followed the war, and the use of various poisonous gases in warfare, have lent additional importance to the subject of toxicology during recent years. Though a number of excellent treatises on this subject are available, the present volume justifies its publication as one which deals with the problem of poisons from the point of view of the clinician.

The book is divided into two parts. The first part discusses in detail the signs, symptoms and treatment of poisoning with inorganic substances and the second part deals with poisoning by various organic substances. A chapter on poisoning by food-stuffs and another on the poisonous animals is included. Illustrative cases given along with different poisons increases the value of the book. Further material has also been incorporated in the three appendices, one dealing with the prevention and compensation of industrial poisoning, the second with the detection of poisoning by post-mortem examination, and the third gives the English and chemical names for the drugs mentioned in the text under German trade names.

The English translation of such an excellent book on toxicology is very welcome. This translation has further been enriched by incorporating, in the body of the original text, a valuable contribution from Professor Koelsch dealing with the subject of occupational and industrial poisoning. We warmly recommend this book to the practitioner and are of opinion that every emergency hospital should have a copy of this book in its library.

R. N. C.

CLINICAL PATHOLOGY.—By P. N. Pantou, M.A., M.B., B.C. (Cantab.), and J. R. Marrack, M.A., M.D. (Cantab.). Third Edition. 1934. J. and A. Churchill, Ltd., London. Pp. x plus 484, with 12 plates (10 coloured) and 50 illustrations in the text. Price, 15s.

Books on clinical pathology do not fall in heavy showers from the cornucopias of the medical publishers of Great Britain, as they do, annually, from those of

North America; this book, therefore, was particularly welcome. It is a book that already has an established reputation, in London from where it originates, in the provinces, and probably in every part of the globe where British graduates are working, as it has that particular practical quality that will always appeal to them. The writers are obviously discussing subjects and describing methods with which, in most instances, they are themselves very familiar, and they are not attempting to demonstrate their erudition and to fill the pages of their book by going beyond the essentials of a subject or giving details of unfamiliar variations of technique. When the subject is beyond the scope of their own practical experience, they have usually obtained outside assistance, as for example in the histological section which has been contributed by Dr. W. W. Woods.

For the benefit of those not familiar with the earlier editions of this book we will give a short list of the various sections, because books on clinical pathology have not yet reached a stage of standardization as have those on many other medical subjects.

The first section is on the blood; this chapter contains some good coloured illustrations of different blood pictures. The second chapter is the longest one in the book, necessarily, as its scope is a wide one; it is on parasitology, and it includes the pathogenic micro- and macro-organisms, from filterable viruses to arthropoda, and the methods by which they are examined and on occasion grown. The subject of immunology is, surprisingly, also included here. The remaining sections are on puncture fluids, the urinary system, including some good figures of urinary casts, etc., the alimentary system, the eye and skin, the respiratory tract, and, finally, histology.

It is a very curious thing that writers who will admit that they are not experts on histology, and have therefore got someone else to write the chapter on this subject, will not make the same admission about protozoology, with which they are probably even less familiar. The impression obtained from some parts of this section is that one is reading the examination answer of a very studious and intelligent candidate. Take for example the paragraph on leishmaniasis; the allusion is maintained by the description of a herpetomonas form as being like a trypanosome without an undulating membrane; we should have cut the candidate a few marks for depicting leishmania, in its somatic stage, only as an extracellular parasite, whereas it is essentially an intracellular organism which is occasionally seen free when a cell has been burst in the process of making the smear; even then we should certainly have given him 95 marks had it not been for the last gratuitous remark—with which the candidate, flushed with success, so often ruins the otherwise good impression he has made—'Natural reservoirs are provided by the dog in some areas and a small rodent, the hamster, in others'. The dog, yes, but as far as we know only one hamster has been found infected in nature, and there was some doubt about that one being an escaped experimental animal. However, even in this section of the book the information is usually sound, and tropical workers will find it very helpful.

We can without any hesitation recommend it as the book on clinical pathology for the student, the practitioner, and the junior laboratory worker; the information is concise, accurate and up to date; and the format is quite up to the best American style, and the price is only about half what it would have been had it been published in that country.

L. E. N.

THE SCIENCE OF RADIOLOGY.—Edited by Otto Glasser, Ph.D. 1933. Baillière, Tindall and Cox, London. Pp. xiv plus 450, with 108 figures. Price, 25s.

THIS is a history of the progress of radiology from the time of the discovery of the x-rays and the emanations of radium.

It will be mainly of interest to American practitioners because it is principally, an account of the progress of radiology in the United States.

Although one must of necessity style this publication a book, it is really a series of short collected papers by different authorities on the various aspects of radiology, for twenty-nine authors have assisted in writing the twenty-five chapters that the book contains.

This practice of many authors combining to produce medical books seems to be growing, especially in America, and while one must admit it has certain advantages in that each aspect of a subject is dealt with by an expert, it destroys the individual character that a book by one author possesses, and gives a very disjointed presentation of any subject. It also leads to a good deal of repetition and the present volume is an excellent example of this fault for almost every chapter opens with a variant of the value of Röntgen's discovery.

RADIOTHERAPY IN THE DISEASES OF WOMEN.—

By M. Donaldson, B.A., F.R.C.S., M.B., Ch.B. 1934. Hodder and Stoughton Limited, London. Pp. xv plus 131. Illustrated. Price, 7s. 6d.

This is a short treatise by one of the best-known British workers in radiotherapy in the field of gynaecology. It is temperate in tone and cautious in opinion, and it utters at the outset a much-needed word of warning on the danger of uninstructed application of radiation by inexperienced persons. It is not enough to have control of a quantity of radium and to push it up against a carcinoma in the vault of the vagina or elsewhere and hope for the best. Such methods only bring discredit on the worker and on radium therapy, and little or no benefit to the patient, but they appear to be common in India where radium work is usually under no recognizable specialized control.

The book deals adequately with the physics of radium and x-rays and with the methods of their application. A section is devoted to the clinical consideration of cancer in the female pelvis (with special reference to carcinoma of the cervix), and with the technique and results at different well-known centres in Europe and America. The importance of proper recording of cases and following up results is well stressed. In this country, where the population in the towns is of a very shifting type, it is usually impossible to trace out more than a very small proportion of cases over any length of time, let alone get an intelligent answer to a questionnaire.

A further section deals with radiation in relation to benign conditions in gynaecology, such as menorrhagia and fibroids, and a chapter is devoted to the dangers of radiation treatment.

Inevitably there are certain inequalities in the composition and proportions of different sections. We are given in detail the elementary anatomy of the uterus, but a very inadequate description of its lymphatics. On p. 55 the author makes the surprising statement that cancer is a disease usually of old age, whereas it is a disease of just-past-middle life. The paths of spread of carcinoma of the cervix are given as (1) by the lymphatics and (2) by spread along the vaginal walls. Later, the commonest mode of all, by direct growth extension in the cellular tissue, comes inevitably under notice. The differential diagnosis of carcinoma of the cervix given on p. 59 is so inadequate as to be better omitted altogether, but the classification of extent of growth (p. 61) is thoroughly up to date and should be taught in all our schools of medicine.

The author is at his best in dealing with operation *versus* radiation in treatment of carcinoma of the cervix, and all operators of experience in this country will sigh for the day when they can be relieved of the awful task of operating on the just-operable case, with its fearful primary mortality and disheartening later results. The stamina of our patients is low and the widespread sepsis following a Wertheim's hysterectomy

so devastating that surgeons are only too ready to use radiation treatment in those clinics where radium is available.

It is surprising to find in a work otherwise so up to date a good deal of space devoted to the treatment of adolescent menorrhagia by radiation of the ovaries. It is true the method is not recommended, but it ought to be categorically condemned. The statement that subsequent pregnancies may result in deformed progeny might have been supported by a reference to the statistics of series published both in America and on the Continent showing (1) that the abortion rate of conceptions following after ovarian radiation is extremely high and (2) that the fetuses are frequently deformed, showing conclusively that, where the egg-cell does ultimately mature, its chromosomes are often severely damaged by the previous radiation, bearing out laboratory evidence to the same effect. Surely the author might have mentioned prolan treatment or irradiation of the pituitary as alternative measures in place of ovarian radiation, giving as they often do brilliant results in pubertal menorrhagia without any danger of damage to the egg-cell? Irradiation of the pituitary is also advocated in the Continental schools for the treatment of menopausal symptoms except in the hyperthyroid type of case. The danger of irradiating inflamed and septic tumours and those associated with pyosalpinx is scarcely referred to, but is a very real one.

In spite of these defects, some of which are minor, the book gives a good account of the scope of radiotherapy in gynaecology and rightly leads us to foresee at no very distant date a great and triumphant future for the methods of radiation, especially in the treatment of carcinoma of the cervix.

W. C. S.

A SHORT HISTORY OF OPHTHALMOLOGY.—By

Arnold Sorsby, M.D., F.R.C.S. 1933. John Balo, Sons and Danielsson, Ltd., London. Pp. vi plus 103. Illustrated. Price, 3s. 6d.

This little book is one of the short history series, a number of which have been recently written, and shows that the ophthalmic art has an interesting history which goes back to ancient times, and the author has very successfully endeavoured to trace the various components of ophthalmology up to the present age.

The history is divided into different periods, the ancient East, the Greek period, the Arabian period, the Western Middle Ages, and the modern period.

Special chapters are devoted to the evolution of the anatomy, physiology and pathology of the eye. There are also special chapters on the pathology and treatment of cataract and glaucoma, ocular therapeutics, spectacles, the ophthalmoscope, and finally ophthalmology in the British Isles.

It is of interest to know that ophthalmology benefited at the hands of Hippocrates who was born in 460 B.C., and there was a continual development up to the time of Galen who was born in A.D. 130. During the long period that followed, up to the 16th century, it hardly advanced at all. The study of the anatomy of the eye and understanding of the mechanism of vision were the work of the 16th and 17th centuries. Great strides in the pathology and clinical examination of the eye were made in the 18th century which was the century of cataract extraction and the artificial pupil.

The second half of the 19th century produced the operative treatment of glaucoma and the discovery of the ophthalmoscope which opened up a new world in the study of clinical ophthalmology.

It is probable that the operation for depression of cataract was known in India from early days, and Celsus' account of cataract and its treatment was the teaching that persisted with hardly any modification up to the 18th century, when Daviel published his account of extraction of the lens which up to this day is one of the recognized methods for the radical treatment of cataract.

Glaucoma in ancient times stood for no definite entity. It was not until 1840 that hypertension was generally recognized as the essential feature in the disease, and prior to 1857, when von Graefe introduced iridectomy for the cure of acute glaucoma, the diagnosis was tantamount to a sentence of blindness. The medical treatment by miotics was unknown till 1875. The great achievement of the 19th century in ophthalmic surgery was the operative treatment of the various varieties of glaucoma. The introduction of asepsis and general anaesthesia produced a new era, in operative eye work as in surgery in general. Local anaesthesia with cocaine was introduced in 1884.

The treatments of squint and lacrimal obstruction were perfected in the same century, although both conditions were recognized in antiquity.

The early history of spectacles is shrouded in mystery. Legend has it that St. Jerome invented glasses (c. A.D. 340-420), although the fact that Pliny records that Nero watched gladiatorial contests with an emerald suggests that they were discovered in remoter antiquity. References to glasses began to appear towards the end of the 13th century. The first medical reference is by Bernard Gordon in 1305, and towards the middle of the 14th century glasses began to have quite a vogue.

It is interesting to find that spectacles were not well received by oculists and met with a remarkable hostility till Donders made the problems of refraction and the rational use of glasses part of the ophthalmic creed.

The book is most interesting, is well written and will prove of great interest to students and workers in ophthalmology.

E. O'G. K.

DIABETIC MANUAL FOR THE MUTUAL USE OF DOCTOR AND PATIENT.—By Elliott P. Joslin, M.D. Fifth Edition. 1934. Henry Kimpton, London. Pp. viii plus 224. Illustrated. Price, 10s. 6d.

We welcome the fifth edition of this popular book of Professor Joslin written mainly from the point of view of educating diabetic patients. The book is full of information which should be of use not only to laymen but also to junior members of the profession who will get substantial help from it to advise their diabetic patients.

The present edition has been thoroughly revised and has been lucidly and popularly written for those for whom it is intended. We have no doubt that it will prove to be as popular as its predecessors.

J. P. B.

DIAGNOSIS AND TREATMENT OF DIABETES MELLITUS.—By O. Leyton, M.D., D.Sc., F.R.C.P. Fifth Edition. Adlard and Son, Limited, London. Pp. 144. Illustrated

This is a more-or-less practical treatise on diabetes intended to help the practitioner to deal with cases of diabetes in a practical and methodical way. The book begins with a description of the method of case-taking, and then goes on to describe methods for the proper diagnosis of the case. In discussing the treatment of diabetes, the author lays great stress on starting insulin without delay as soon as the case is diagnosed. As regards diet, the author does not seem to be in favour of restricting the total diet of the patient, if the disease is not well advanced, but is content to rest on an arrangement whereby the carbohydrates are so distributed at the several meals that the greater part is taken during breakfast and dinner, unless the patient is willing to submit himself to three injections of insulin daily. The author's views on the subject may be summarized as follows:—

Since insulin is now obtainable in any quantity and at a cheap rate the majority of the patients may eat what they like, but it is absolutely necessary for them

to eat the same allotted quantity of carbohydrates, protein and fat distributed in the same manner.

The author's method of treatment, different as it is from that of many other workers, may be quoted in his own words. 'At the present day the skill of the physician has to be devoted not so much to actual quantities of carbohydrate, protein, and fat suitable for individual patients, as to the correct distribution of the food throughout the twenty-four hours and the determination of the number, size and times of administration of the doses of insulin'.

We are of opinion that the general practitioner will find the book useful in his practice.

J. P. B.

THE CHEMISTRY OF ANTIGENS AND ANTIBODIES.—By J. R. Marrack. 1934. (Medical Research Council. Special Report Series, No. 194.) Published by His Majesty's Stationery Office, London. Price, 2s. 6d.

The nature of the reaction between antibody and antigen is a subject that particularly lends itself to theorizing. At the outset Ehrlich gave us a theory which is not generally accepted to-day, but is in some ways as good a theory as any, and is the one on which all modern theories are built. Recent advances in our knowledge of physical chemistry, more especially with regard to the size and shape of molecules and the radii of atoms, which have been effected through the x-ray study of crystals and other new methods, have provided opportunities for approaching this problem from a new angle. Of this opportunity Dr. Marrack has taken full advantage and his report forms a valuable contribution to the subject of immunology.

A STUDY OF GROWTH AND DEVELOPMENT: OBSERVATIONS IN SUCCESSIVE YEARS ON THE SAME CHILDREN.—By R. M. Fleming. With a Statistical Analysis by W. J. Martin. (Medical Research Council. Special Report Series, No. 190.) Published by His Majesty's Stationery Office, London. 1933. Price, 1s. 6d.

We realize more and more how important it is to obtain normal standards. The obtaining of these is usually a very laborious and monotonous task, and the collection of the anthropometric records that are analysed in this report can have been no exception. Over four thousand children, between the ages of 3 and 18 years, were examined, some of them as often as six times.

Many interesting differences between the two sexes are brought out; amongst these are the earlier development and the earlier cessation of growth of girls. About 60 per cent of girls have ceased to grow in height at the age of 17, whereas this applies to only 25 per cent of boys. Others, mostly boys, grow as much as 5 inches during their 18th year of life; such children are very liable to break down and require special medical attention.

The actual figures in this report will, of course, not apply in India, but they will be of great value to the worker in this country for purposes of comparison.

INDIAN PSYCHOLOGY: PERCEPTION.—By Professor Jadunath Sinha. 1934. Kegan Paul, Trench, Trubner and Company, Limited, London. Pp. xvi plus 384. Price, 15s.

The author has collected together in this volume the theories held by Hindu psychologists regarding different forms of perception including those of space, time, 'the universal' cognition, the self-illusions and dreams, and abnormal and yogic supernatural perception. The present-day experimental psychologist as well as the psychologist trained in the academic school will find much that is of interest in this volume. In explaining the different forms of perception and in elaborating theories and criticisms the Hindu mind indulged in subtleties scarcely found amongst western scholars. The author in his preface asserts that there

was no empirical psychology in India yet in the next paragraph he says that Indian psychology is based on introspection and observation. There is no doubt that the ancient Hindu mind showed a special introspective ability. The materials obtained by introspection had to be treated from the epistemological standpoint for the purposes of metaphysics and philosophy. Indian psychology and metaphysics are mainly based on psychology hence psychological problems have been discussed by all the different schools of philosophy founded in India. The author has translated the Sanskrit term 'Indriya' as 'sense organ' and has consequently divided the 'sense organs' into two groups, namely, five organs of knowledge (Buddhindriya) and five organs of action (Karmendriya). The term 'sense organ' has now been borrowed from the modern physiologist and it is an unjustifiable liberty to include organs of action within the term 'sense organ'. This, however, is a minor point. There are many interesting discussions in the chapter on time which seems to be the best in the book. The theories of perception of movement and of 'the universal' propounded by ancient Hindu psychologists will no doubt be read with very great interest by the modern *gestalt* school. In the chapter on dreams we do not find any mention of the Upanishadic and the Puranic theories on the subject. No western scholar who deals with the problem of perception could afford to neglect this book. The main defect of the book lies in the fact that no synthetic presentation of Hindu psychology has been attempted. The different chapters of the book read like so many pages of disconnected lecture notes. The book could have been written in a more interesting way, but all the same we have no hesitation in saying that the book removes a long-felt want and will be of immense help to those who want to do research work in Indian psychology.

G. B.

A NEW PHYSIOLOGICAL PSYCHOLOGY.—By W. Burridge, D.M., M.A. (Oxon.). 1933. Edward Arnold and Company, London. Pp. vii plus 158. Illustrated. Price, 7s. 6d.

PROFESSOR BURRIDGE differs from the neurological doctrine concerning the nature of the fundamental processes, which had its foundation in the conception of synoptic resistance. He has developed a new system of physiological psychology on the basis of his intimate physiological studies of different organs, especially the heart and the eye, and proceeds to state that the central neurones and end-organs are rhythmically active structures whose energy exchanges are mediated by two kinesiophores, the interaction between the two providing the dynamic energy for evoking response.

The new doctrine is well summarized in this brief treatise and the hypothesis of balance is assumed. Suggestion has been made that Freud's psychological principles regarding the relationship between kinesiophores should be looked upon as synergist and not as antagonist.

Professor Burridge next proceeds to make a scholarly and interesting examination of the memory and dream, from the point of view of central neurone-rhythm outlined by him, and develops a picture 'of an organ of mind consisting of a vast complex of discrete groupings of neurone, each group dancing to its own rhythm with its own strength'. All the problems of mental functions and disorders, as well as his concept of shock, fits and spasms, are well embraced within the scope of his theory.

This thoughtful volume should be studied by all interested in the relationship between the body and mind. It is an admirable attempt on the part of the author to correlate the mental phenomena and the processes taking place in the nerve cells and will interest psychologists and neurologists.

R. N. C.

AN INTRODUCTION TO THE BIOCHEMISTRY OF NITROGEN CONSERVATION.—By Gilbert J. Fowler, D.Sc., F.I.C. 1934. Edward Arnold and Co., London. Pp. viii plus 280. Illustrated. Price, 12s. 6d.

THE subject of nitrogen conservation was discussed in the February number of the *Gazette*. The economic importance of the subject to an agricultural country like India was pointed out and two papers were published showing how town refuse and nightsoil could be treated in such a manner as to fix the organic nitrogen by biochemical processes, the result being a compost containing nitrates and phosphates of high agricultural manurial value. Dr. Fowler has devoted the whole of his life practically to the study of nitrogen conservation and the present book is a summary of modern work and knowledge on the subject, much of which has been done by Dr. Fowler himself or at his instigation and under his guidance. The activated-sludge process initiated by Dr. Fowler is so far the most successful method of treating sewage and conserving nitrogen. The original source of organic nitrogen was probably and is still largely atmospheric nitrogen. This can be fixed from air in organic combination by some species of free living organisms (*Azotobacter*, *B. lactis aerogenes* and *clostridium*), and by various micro-organisms symbiotic on leguminous plants. Nowadays, such fixation of atmospheric nitrogen is being done by electrical, thermo-electrical and thermo-chemical methods. In the nitrogen cycle of nature, fixed nitrogen may be lost as atmospheric nitrogen and ammonia. This loss is due to the action of certain micro-organisms. In sewage disposal, by dilution in water, fixed nitrogen is lost by dissipation in the sea. The main problem is to prevent the loss of fixed nitrogen which occurs by biochemical action. The obvious thing is to counteract this by other biochemical agencies. The question therefore includes study and knowledge of the chemical structure of nitrogenous organic materials, the changes these may undergo by enzyme and other action, and also a knowledge of the living agencies in soil and water and excretal matter that act in any way in nitrogenous matter. Experimentation has been ahead of precise knowledge and it is hardly realized yet what a big field of work still remains untouched.

The book deals in detail with the various chemical changes that take place in the building up and breaking down of nitrogenous matter, with nitrogen fixation and the chemistry of sewage purification. The book will be of great value to sanitarians and public-health chemists, and, despite the unavoidably large number of chemical equations, the book makes intensely interesting reading. We are indebted to Dr. Fowler not only for his original work, but for bringing together in a comprehensive and logical manner a very complete résumé of one of the most important biochemical problems in nature. Physiologists, biochemists, sanitary engineers, and public-health workers will find the book invaluable.

A. D. S.

LA GANGOSA ET LES RHINO-PHARYNGITES MUTILANTES DES TROPIQUES.—By Dr. Georges Galinier. Paris Jouve & Cie, Editeurs, 15, Rue Racine, 15, 1934. Page 76. Bibliography—127.

THE literature on this disease is carefully reviewed in the light of the geographical distribution and pathology. Diagnosis and differential diagnosis are considered carefully. Dr. Galinier considers that the importance of the yaws factor is less than is usually estimated, and that, though the disease may be caused by or connected with yaws, it is also connected with many other diseases, such as syphilis, leishmaniasis and blastomycosis. He considers it to be a disease the history of which is unable to offer a proof of aetiological connection with any of these diseases. He considers that the term 'gangosa' or 'mutilating rhino-pharyngites' should be applied to secondary affections which accompany or follow leishmaniasis, tertiary yaws

and syphilis. The distinctive lesions are found only in tropical countries, and include all ulcerations of the nose and pharynx which are exceedingly chronic in nature and which cannot be recognized as caused by any other definite disease.

E. M.

AIDS TO NEUROLOGY.—By E. A. Blake Pritchard, M.A., M.D. (Camb.), M.R.C.P. 1934. Baillière, Tindall and Cox, London. Pp. vi plus 376, with 44 figures. Price, 5s.

DR. PRITCHARD'S *Aids to Neurology* is a handy book on the diseases of the nervous system, intended for the use of students in the early years of their clinical training. The book comprises five chapters, a preliminary one being devoted to anatomical and physiological considerations of different parts of the nervous system and a description of symptoms arising out of regional disturbances of this system. The other chapters include the peripheral nervous system, the spinal cord, the brain and the autonomic nervous system. The subject-matter has been clearly dealt with, without any unnecessary detail as to the various theories embracing it, and is thus eminently suitable for the students for whom it is intended. There are numerous diagrams in the text to illustrate the effects of lesions of the peripheral nervous system including sections of brain and the spinal cord. The author has done well in including a chapter on the function and disturbances of the autonomic nervous system—a subject which is gradually growing in importance. The appendix contains a scheme for systematic examinations of the nervous system. The book will be useful to the students going up for examinations.

R. N. C.

HANDBOOK FOR HEALTH VISITORS IN INDIA.—By Dr. Ruth Young, M.B.E., B.Sc., M.B., Ch.B., W.M.S. 1933. Maternity and Child-Welfare Bureau, Indian Red Cross Society, New Delhi. Price, Re. 1-8

THIS invaluable handbook should be of the greatest service to health visitors and to all those, whether doctors, nurses or others, who have to do with the training of health visitors or the organization of child-welfare work in India. It is meant to be used along

with another book by the same author, *Antenatal Work in India*, published in 1930. The present volume therefore begins with the care of the newly-born infant and does not deal with antenatal work. Continuing it deals with the general development and care of the normal child, and his feeding. A chapter deals with the premature baby, and several chapters are devoted to the all-too-common disorders and ailments of infancy and childhood which can be so easily avoided with knowledge and care, but which neglected can lead to such dire results. Stress is laid on the prevention of these by efficient teaching of the mothers, and early recognition. The teaching is short, pithy and to the point. The author's unrivalled knowledge of conditions among women and children throughout India enables her to advise the health visitor of the difficulties that are likely to arise, and the best way of tackling those and of securing the co-operation of the women. The remaining chapters which are of great interest deal with the history and aim of the child-welfare movement, the organization of child-welfare work, and the work and duties of the health visitor. The final chapter gives an illuminating account of how vital statistics should be understood and used by the health visitor. Dr. Young insists that those who promote child-welfare schemes should have a clear idea of what they aim at, and of the best organization to realize that aim. 'Prevention is and must be the guiding principle'. Too often in India 'the movement degenerates into an agency for dealing inadequately with children's ailments, or for doling out charity'. The best organization is one which allows of thorough and scientific work, better to confine the work to a small area and do it properly than to cover a wider area inefficiently. Great stress is laid on home visiting as the basis of the work. The visitor must visit the homes of all infants born in her area, and must keep constantly in touch with these infants during the first year of life. The work of the clinic is secondary and complementary to that of visiting. Dr. Young calculates that one health visitor can deal efficiently with an area in which 200 births occur annually, if she is expected to do more she cannot carry out her work properly. This book will prove inspiring to all those interested in the problems of preventive medicine.

J. M. O.

Abstracts from Reports

THE ANNUAL REPORT OF THE PUBLIC HEALTH COMMISSIONER WITH THE GOVERNMENT OF INDIA FOR 1931

It is with considerable interest that we turn to this report. It is Major-General Graham's last report, as he has now handed over the reins of office of Public Health Commissionership after 10 years' work of first-rate quality. He has been an outstanding personality in international and Indian public health and his departure is a matter of deep regret.

We naturally turn to the last section of the report headed 'Retrospect; Reflection and Conclusions'. Here we are treated to an excellent résumé and history of public health matters in India during the last 10 years, and a concluding paragraph on the future possibilities and likelihood of progress in this most important aspect of Indian welfare. General Graham describes the position of the Central Health Organization at headquarters in 1924, and the circumstances which the adoption of the recommendations of the Retrenchment Committee (Indcape's) had produced. The Government of India Act of 1919 had transferred public health responsibility largely to the provinces and had limited the serious activities of the Central Health Department almost entirely to external matters. In this respect

General Graham has been a true ambassador. Previously, India had not counted much in international health matters and had been very inadequately represented. General Graham's attendance at the bi-annual meetings of the Office International in Paris, at the League of Nations Health Committee at Geneva, at the Eastern Epidemiological Bureau (as Chairman) at Singapore, at various international conferences on rabies, plague, malaria and other matters, placed the work of medical and research workers in India at once in a proper perspective, and instead of being ignored, India's opinion on medical and public health problems was not only listened to with respect and interest but sought.

It is interesting, as General Graham points out, to forecast the lines of development of Indian public health policy, and to speculate whether it will follow the lines indicated in the Government of India's resolution on 'Sanitary Policy' published in 1914. Just at present, the financial crisis is made an excuse for refusing every expansion of expenditure on public health, but it is likely that in the more advanced provinces, informed opinion is beginning to demand an expenditure on public health measures commensurate with their importance.

The formation of a Central Health Board which will function as a Federal Health Board is a point which naturally must have recently received very close attention from the Government of India. General Graham has been anxious that there should be a considerably strengthened Central Health Board formed now at once, which would form the backbone of a Federal Health Organization. We trust this will be so. The international health work for India during the last 10 years has been assiduously fostered by General Graham and it is to be hoped that the framework of such a Federal Organization which he has indicated should be at once constructed.

One of the difficulties at present is to appraise exactly the health position of India. On several occasions, the annual Conference of Research Workers has unanimously passed resolutions calling for a comprehensive enquiry into the state of health of the country, particularly with a view to evaluating the causes of its present unsatisfactory condition. This proposal has been strenuously supported by Sir John Megaw and General Graham. Such a commission would be representative and would consider all the factors influencing health, viz, population, finance, wages, disease, diet, etc., and would be able to pave the way for some more permanent and practical scheme of economic uplift.

In the last chapter of his report General Graham passes in review the progress of research in India, the formation and activities of the Indian Research Fund Association, the Scientific Advisory Board, the Research Workers' Conference, and the various publications sponsored by the Indian Research Fund Association, and the question of a Central Research Institute. Two important Royal Commissions, viz, on Labour and on Agriculture, have been closely connected with health, and the Drugs Enquiry Committee was also of great importance. The problems of education also are closely and intimately connected with health progress, and General Graham thinks he sees indications that the stage has become set for a distinct advance in this direction. The fact that Indian women reformers are advancing educational movements so much is he also thinks particularly hopeful.

The last chapter of General Graham's report has been reprinted and is now available separately. We heartily recommend it as one of the most interesting publications of the year to those interested in India's welfare and in its health progress.

Turning to the review of India's public health in 1931. This is compiled from the statements received from provinces and as these are not compiled until late in the following year, the Public Health Commissioner's report must appear much later than the year it reviews. General Graham points out that as this is the only comprehensive review of the health questions of all India, it is a publication perhaps more referred to outside India than in India itself. He indicates how it may be improved by a better arrangement of the statistical tables, the removal of much statistical matter from the narrative and the introduction of observations of more general interest. For these, additional expert staff is necessary.

Several interesting diagrams illustrate the death rate, birth rate and infantile mortality rates of India compared with other countries. The birth rate of British India for 1932 was 34.3 per 1,000, the highest of the countries cited, except Palestine. The death rate was 24.8, again the highest, except Palestine. The infantile mortality was 179 per 1,000 births, the highest rate of any amongst the countries quoted.

The population was taken in February 1931 and was 271,526,933, an increase of 10 per cent over that of 1921. The increasing population of India has been the subject of many discussions in the scientific and lay press, and much considered opinion tends to be pessimistic of any hope of improvement in the economic state and health of Indian masses, as long as the present rate of population increase goes on. Many are in agreement with this point of view, but there is a

danger that with unthinking people it may be the excuse for a slackening of effort in health education. Many health administrators think that the best way to restriction of population is by a reduction in death rates and all the advances in education and intelligence and foresight which such reductions must imply. How best to get on with this is the question.

Features of recent reports are the excellent diagrams and maps illustrating the distribution and incidence of the main diseases of India. 'Fever' claim 15 per 1,000 out of the total death rate; this represents 60 per cent of the total mortality; 25.2 per cent is accounted for by 'other causes'; 6.4 per cent by respiratory diseases; 4.1 per cent by dysentery; 3.3 per cent by cholera; 0.7 per cent by plague and 0.6 per cent by smallpox. An attempt is being made, particularly in Madras, to disentangle the multifarious diseases included under 'fevers'. Details are given of the incidence of disease in each province and of the measures taken to combat these. It is difficult to extract matters of interest as the report itself is a compilation of the most important parts of the provincial health reports.

An interesting review of the public health administration all over India is given in section IV. The health administration of ports, railways and jails is commented on, and medical education has a section to itself, in which details are given of the various medical schools and colleges in India and their work, and the number of medical men turned out from them annually. Medical research is fully dealt with in summary form, while much useful and interesting information is given of the work and administration of the various voluntary health organizations such as the Indian Red Cross Society, The St. John Ambulance Association, the British Empire Leprosy Relief Association, the Countess of Dufferin Fund, the Lady Chelmsford All-India League for Maternity and Child Welfare, etc. The present form of the report is perhaps rather terrifying to the ordinary reader and we agree that if the interesting parts could be separated from much of the statistical matter, there would be a greater chance of the report receiving the careful reading and attention which it so thoroughly deserves.

THE REPORT OF THE EUROPEAN MENTAL HOSPITAL AT RANCHI FOR THE TRIENNium 1930-32

This report covers a period of three years, namely, 1930, 1931 and 1932.

During the period under review, this hospital continued to receive patients, European and American, including those of mixed blood, from Bengal, the United Provinces of Agra and Oudh, the Punjab, Bihar and Orissa, the Central Provinces, Berar, Assam and British Baluchistan. It also received patients on transfer from any mental hospital in India, provided the governments of the provinces in which they were domiciled agreed to bear the proportionate cost of maintenance of this hospital on account of those patients.

It is noteworthy that during the triennium under review, the Government of India authorized reception of European-mental patients into this hospital from the French Settlement of Chandernagore.

A new system of inspecting and reporting on patients was introduced. Hitherto patients were inspected and noted on in routine with the result that many patients were not seen often enough and some more often than necessary. It is now the business of the house physicians, occupational therapists and nursing sisters to put up patients for inspection whenever any change, for better or worse, is noticed in them. This procedure keeps the medical superintendent and the deputy superintendent better informed than did the old one of signs of improvement or the opposite in patients. Improvements now meet with instant encouragement, and relapses can be met by appropriate measures for prevention.

Special methods of treatment

Seven male and seven female patients were treated with sulfosin. One per cent solution of sulfosin in olive oil was injected intramuscularly bi-weekly starting from 1 c.cm. and increasing to 12 c.cm. Of the males, only one patient showed signs of improvement and was eventually discharged. Of the females, two patients improved sufficiently to be discharged, two showed only temporary improvement, and three did not improve.

Organotherapy had been tried on three female patients but without effect. Injections of thylin and posterior pituitary gland tablets were used to raise the blood pressure, but without success.

Two cases of general paralytic insanity and one of hypomania had been treated with induced malaria. The mental state of the first two showed slight improvement, but in the case of the third the improvement was only temporary, but the physical state improved considerably.

Occupational therapy.—This important treatment continues to maintain its efficiency, in spite of our having to work short-staffed on account of retrenchment. Although no new occupations, other than those mentioned in the previous year's report, were introduced, patients continued to display as much interest as ever in what they were doing, so the therapeutic value may be regarded as undiminished.

The percentage of attendance of patients in the occupational therapy department increased from 93 per cent to 94 per cent this year (1932), and there were many voluntary workers who occupied themselves even out of occupational therapy hours. The articles manufactured in the occupational therapy class were, as usual, exhibited for sale, and it was very gratifying to find that sales increased considerably.

Route marches, swimming, rowing and weekly picnics were carried on as usual and the interest shown in these pastimes by even quite apathetic patients was very encouraging.

Physical culture, conducted by an instructor, has improved wonderfully. Physical culture has proved a very satisfactory therapeutic measure. An instructor has been sanctioned by the Board of Trustees of this hospital from the beginning of this financial year to train the patients in various exercises as well as in boxing and outdoor gymnastics.

My eldest son arranged a boxing tournament in which a few patients took part, and it is very satisfactory to note that one of them won his fight against an outsider.

Sports and amusements.—During the year, games, amusements and physical exercises have been developed to an extent that has never existed before. The appointment of an experienced and zealous physical instructor, Mr. S. K. Bose, has done wonders in promoting interest in boxing, physical training and gymnastics. Male patients gave a number of exhibitions of physical exercises and gymnastic 'pyramids'. All this has done a great deal to dispel the apathy of introverted patients as well as to improve their physique.

Football, cricket and hockey matches were played according to the season, as usual.

In respect to other forms of recreation, it is important to record the installation, during the year, of a stage with scenery and two green rooms. The acquisition of a stage has given a great impetus to the development of tableaux, physical displays such as gymnastics and pyramids as well as step-dancing and choral singing. Both Mrs. Mason, the music and dancing mistress, and Mr. S. K. Bose, the physical culturist, have worked wonders in this department. There have also been two or three 'cabaret' shows. A concert that was held during the Pujah holidays realized Rs. 127-8-0. Besides our own entertainments, two travelling troupes performed during the year, the Laprotti's and the Sequins. Through the generosity of the Board of the Trustees the hospital was permitted to acquire at a cost of Rs. 1,000 an electric gramophone

with a 'wireless' installation. The latter has enabled us to listen-in to the music, speeches, etc., in different parts of the world.

Band.—The loss of our band, through its retrenchment, was felt so keenly that the staff decided to sustain a small band of nine players through private subscription. This band under the leadership of Captain A. T. Mayes, the steward of this hospital, has given a great deal of pleasure to both patients and staff. During the year it obtained some engagements to play in Ranchi and its earnings were a very welcome addition to the band fund.

I would like to take this opportunity of thanking the children of the staff including my own for their help in contributing to the displays given on the stage. We, parents, may congratulate ourselves and one another in having children who are so ready and eager to assist us in promoting the welfare and happiness of those committed to our care and treatment.

Games.—Outdoor and indoor games were kept up to standard throughout the year. Improvements and additions worth noting are the introduction of mixed hockey and basket ball. About 60 per cent of the residents were able to participate in them.

During the year, ten cricket, thirteen football and four hockey matches were played with outside teams.

During the year the hospital teams both A and B, entered for the Namkum Football Cup Tournament and went up to the semi-final.

Cinema.—The hospital cinema continued to give regular displays throughout the triennium under review. This has added to the entertainment of the patients and has been of great therapeutic value.

The above abstract indicates that the efforts at making the inmates lives as happy and useful as possible is being continued with unabated energy and success.

THE REPORT OF THE FIFTY-NINTH YEAR'S WORK IN INDIA OF THE MISSION TO LEPERS. SEPTEMBER 1932-AUGUST 1933

THE Mission to Lepers is able to report that in spite of the universal depression they have been able to show an expansion in their work by treating more patients in their homes than during any other year in its history and there has also been an increase in the number of out-patients at institutions aided by the Mission.

For many years now it has been recognized that occupation suited to individual patients is of distinct benefit when they are under treatment in an institution and a striking example of the practical application of this principle is reported from the home at Raniganj in Bengal. A certain sum of money was contributed by friends in Dublin and with this aid the inmates themselves, quite unaided by outside help, built an operating theatre and sick room even making the bricks themselves.

The general report is followed by short separate reports from the numerous homes throughout India and at the end there is a review of the medical work for the year. This is by Dr. E. Muir, research worker in leprosy at the School of Tropical Medicine, Calcutta, and it is abstracted at length, below.

'After expansion—consolidation': this is the natural course of things. While the homes of the Mission to Lepers in India still show expansion along certain lines, as more in-patient accommodation has been provided, the most notable feature of the year is more along the lines of consolidation. There is a marked increase (20 per cent) in the number of cases in which the disease has become arrested without deformity. This means that cases have been treated earlier and also that more labour and skill are being used in the care and prevention of ulcers and abscesses.

Equally important is the after-care of those who have recovered after years spent in the homes; when discharged once more into the outside world the strain

may be too great and relapse may occur. In the after-care of tuberculosis the Papworth Colony in England, by providing employment graded to the strength of the patient, has smoothed the way to complete and confirmed strength. We need something along similar lines for the after-care of those discharged from the leper homes.

We cannot yet say that we have any sovereign remedy for the treatment of leprosy. Advance is at present being made rather along the lines of more uniform and consistent application of such remedies as we have. Fresh light is beginning to break through on some of the factors which control the spread of infection and it is likely that while due importance will continue to be given to treatment, more and more stress in future will be put on preventive work. It is easier to prevent the disease in ten cases than to remove it in a single one.

The Mission to Lepers is the only organization in India that has emphasized in a practical way the importance of the care of children and their separation from their leprosy parents. All recent work tends to show the value of such precautions. Statistics show that 40 to 50 per cent of children who remain in contact with their leprosy parents develop the disease, while there are only 2 to 4 per cent of conjugal infections. If we take the number of children who remain in contact with infectious leprosy parents (that is with the more advanced cutaneous cases), the number infected would probably be nearer 100 per cent. Children are obviously less resistant to leprosy in their earlier years, and the chief stress in any campaign against leprosy must be laid on the separation of children from their leprosy parents at birth, however that may be accomplished.

The Mission to Lepers in India is now, as in the past, readily adapting itself to new methods once these have been shown to be of real value, and often it has led the way in the practical demonstration of these new methods.

ANNUAL PUBLIC HEALTH REPORT OF THE PROVINCE OF BIHAR AND ORISSA FOR THE YEAR, 1932

BIHAR AND ORISSA forms a composite province stretching from the Himalayas to the Bay of Bengal, and touching Nepal, the United Provinces, the Central Province, Madras Presidency and Bengal.

Its population as shown by the 1931 census was 37,677,576; the total percentage increase over 1921 is not given in the report. The birth rate for 1932 based on the 1931 census population was 33.8; the death rate 20.6 per 1,000; the infant mortality rate was 128.8 per 1,000 births.

The registration of vital occurrences is admittedly defective. In the rural areas they are not compulsorily registrable, and the reporting agency is the police. In the municipalities, attempts are being made to transfer the registration duties from the police to the municipalities themselves. In Patna, the health officer is now the registrar and the results are satisfactory.

Of the causes of death, 'fevers' account for a very large proportion, the figure for 'fevers' being 15 out of the total of 20.6 per 1,000. The Director of Public Health notes that malaria is the chief direct and indirect cause of the fever mortality. As the respiratory disease figure is only 0.1 per 1,000, it would appear that these causes of death are probably being reported under 'fevers'. One naturally turns to the section on cholera for information and opinion as to the results obtained in treatment and prevention of this disease in an endemic province by the various measures, sanitation, disinfection, inoculation and bacteriophage, now being adopted. Eleven districts now have health officers; government maintains a permanent staff of epidemic doctors of the assistant-surgeon class who are available for duty on demand from any district. Provision is also made for 100 epidemic vaccinators for employment anywhere in emergency. A reserve of disinfectants is also maintained which are available to assist local

bodies in dealing with epidemics. Cholera vaccine is also given free on demand. In the districts of Purnea and Muzafferpur bacteriophage was experimented with for the second year in succession, other methods being in abeyance in these two districts. Taken all over, cholera was prevalent only to a slight degree in the province in 1932, accounting for 9,348 deaths, with a death rate of 0.2 per 1,000, compared with 1.1 in 1932, and 1.5 for the previous 10 years average. The Director of Public Health is evidently convinced of the efficacy of bacteriophage in the treatment of cholera in the district and adduces figures in support. In Muzafferpur in 1932 the case mortality for 'treated' cases was 6.1 and in the untreated 69 per cent. In Purnea the case mortalities were respectively 29.89 and 84.3 per cent. No indication is given of how cases were selected for treatment and otherwise, and it would appear possible that the 'untreated' side was very likely loaded with many severe cases who had no opportunity for treatment by bacteriophage, or perhaps by anything else. The figures as stated are not quite convincing. The length of individual epidemics appears in Muzafferpur to have been shortened considerably by the use of phage.

There are several large fairs and melas held regularly in the province—especially at Gaya, Puri and Sonapur. The sanitary control of the fairs is improving year by year, special attention being paid to water supplies. Puri apparently still draws its water supplies from shallow wells. If we remember rightly, some years ago the report mentioned that experiments were being tried with tube wells. These have evidently not been successful. An abundant and safe water supply for a town of this size and importance is a necessity. Water supplies all over the province, especially in Orissa, are not very satisfactory; in Orissa diarrhoea and dysentery are very prevalent and cause high mortality.

Smallpox mortality (0.4 per 1,000) was double that of 1931 (0.2 per 1,000). The Vaccination Act is in force in some areas, but, as the Sanitary Commissioner to the Government of India pointed out some years ago, primary vaccination is just as efficiently carried out in places where there is no compulsion as in places where there is.

Plague was prevalent only to a small degree, giving a mortality of 0.09 per 1,000, compared with 0.3 for the last 10 years.

In the matter of administration, progress is being made in the employment of health officers either governmental or local in municipalities and districts, but financial stringency has largely stopped expansion in this direction. The inspection work of the assistant directors of public health seems to be thorough and effective.

Correspondence

THE NEW BRITISH PHARMACOPŒIA AND INDIAN USAGE

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR,—It is of more than passing interest to note the effort made in previous pharmacopœias to popularize drugs peculiar to India and other tropical parts of the British Empire, first by their introduction in the form of an addendum to the British Pharmacopœia of 1898 and then by their introduction into the actual text of that of 1914.

That this effort has not been a success, the perusal of the new pharmacopœia will abundantly prove. No fewer than 357 articles and preparations have been deleted from the present British Pharmacopœia, and in this wholesale clearance of dead wood from the pharmacopœial tree nearly all of the Indian drugs more or less on trial since 1898 have been swept away.

First of all we may take the case of those drugs which were admittedly introduced as substitutes for

the better-known foreign article. Of these, Gummi Indicum in the place of Acacia, Kaladana in the place of Jalapa, Uriginea in the place of Scilla and Valeriana Indica Rhizoma in the place of Valeriana are all well known. Since the foreign drug remains official we may well ask why have not the Indian alternatives remained in the Pharmacopœia?

The answer surely is, that these substitutionary articles, though equal to the foreign drug, have not obtained the support of the Indian medical profession for whose benefit they were especially introduced into the 1898 and 1914 Pharmacopœias.

Here is a proof that practise is often far removed from precept; for whilst many blame government for its indifference in the matter of developing the indigenous drug trade, and others are professing a love for Indian medicines with the slogan 'Back to the Vedas', here is a case in point that Indian drugs even with the powerful backing of the official pharmacopœia cannot obtain a foothold in the Indian doctor's armamentarium, he rightly or wrongly being obsessed with the idea that the foreign article is to be preferred.

The case of other former British Pharmacopœia Indian substitutes for their foreign rivals is different to those mentioned above, inasmuch as not only the Indian preparation but also the foreign article for which it stood has been removed from the Pharmacopœia. If the original be deemed unworthy of a place within the covers of the 1932 Pharmacopœia we can hardly expect that the alternative Indian drug would survive. This has happened in a number of cases, e.g., *Galla* has gone and with it the substitute *Myrobalanum*, *Hæmatoxyli Lignum* and with it the substitute *Sappan*, *Kino* and with it the substitute *Butæ Gummi*, *Scammonie Radix* and with it the substitute *Turpethum*. One feels that the loss of these drugs both original and substitutionary will hardly be mourned, but can we say the same of some other Indian drugs which were in the 1914 Pharmacopœia and have been deleted from the present one? Readers will hold views of their own, but for my part I place a value on old friends with a distinct value on their own account such as *Alstonia*, *Bela Fructus* and *Ispagula*, though many may not agree that this selection is either wise or discriminatory, it would at least appear to be as reasonable as the retaining under a separate monograph of *Podophyllum Indicum*. One wonders why *P. emodi* was not included with *P. peltatum* as the source of *Podophyllum*.

Turning from omissions to additions we find very few (if any) of the 128 new articles and preparations of purely Indian origin. Probably *Oleum Hydnocarpi* and *Oleum Hydnocarpi Aethylicum* come near to this distinction, whilst others not so far removed from it are:—*Ephedrine Hydrochloridum*, *Totaquina*, and *Oleum Gossypii Seminis*.

Again, one wonders, are there not some really valuable drugs of Indian origin worthy of a place along with the select few? I think there are, and of these I venture to put forward *Holarrhena antidysenterica* (*Kurchi*), *Psoralea corylifolia* (*Bouchi*), *Saussurea lappa* (*Kuth*).

The well-known properties of *Kurchi* and its specific action in chronic amœbiasis surely demand for it a place in an Empire Pharmacopœia. For leucoderma I do not know of any drug to equal Oil of *Bouchi* and in Asthma we need an extensive pharmacotherapy which might well be augmented by the addition of *Saussurea lappa*.

May I suggest that the pharmacopœial authorities have made a mistake in not recognizing the goat as on an equality with the sheep in all cases where the latter animal is referred to?

I imagine that Indian makers of *Extractum Hepatis Liquidum* and *Siccum* will not be careful to specify *ovis*; they will be equally well pleased to obtain from Indian abattoirs the much more frequently slaughtered *capra*. This observation will also apply to other official preparations where sheep and not goat is specified:

e.g., *Sevum* and *Thyroideum*. In the latter case, oxen, sheep, or pigs are directed to be used. Local circumstances might make it difficult to obtain any one of these animals, but I feel sure a goat or any number of goats would be easily obtainable.

Appendix XIX, page 637, paragraph 4, directs that for fresh lemon peel dried lemon peel may be substituted (in certain preparations named) where the fresh lemon peel cannot be obtained, but in the same page, paragraph 1, it states that, where bitter oranges cannot be obtained, fresh sweet orange peel may be used. Then why not allow for the substitution of fresh lemon peel the fresh peel of the lime *Citrus medica*, which though not containing an amount of volatile oil equivalent to *Citrus limonia* could easily be adjusted by using an extra amount. Fresh lime peel is nearly always obtainable, fresh lemon peel only in localized areas.

Yours, etc.,
T. D.

JOBAT STATE,
CENTRAL INDIA.

PLANOCAINE IN SPINAL ANÆSTHESIA

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR,—May I point out, to any who feel reluctant to use percaine on account of the waste of time entailed in keeping the patient in the prone position for ten minutes after injection, that the prone position is now considered unnecessary.

I now give percaine, the usual hypoboric solution, with the patient sitting up. Depending upon the height of anæsthesia required, the patient is allowed to sit up from twenty to forty seconds after the commencement of the injection.

He can then be placed in the dorsal position, with the table tilted downward by the head through an angle of 15°, the tilt being reduced by 5° after five minutes.

A detailed description of this method will be found in the *Proceedings of the Royal Society of Medicine* for February 1934.

Yours, etc.,
M. M. CRUICKSHANK, B.Sc., M.D., CH.M.,
MAJOR, I.M.S.

MADURA,
26th April, 1934.

RESULTS OF GOLD THERAPY

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR,—In the March issue of your journal, we read the article 'Results of Gold Therapy' on page 179.

Referring to the dosage mentioned in the article for Solganal B Oleosum, we observe that the strength advocated is 0.005 to 1.0 gramme of the preparation twice a week.

We feel that the dosage advocated is too high and perhaps these doses have been confounded with the aqueous solutions of Solganal, i.e., Solganal and Solganal B.

From the circulars we issue with these drugs you will find that our largest dose of Solganal B Oleosum is 0.4 gramme and in the scale of dosage we advocate for tuberculosis you will observe that we recommend the doses ranging from 0.1 gramme to 0.2 grammes. The last-mentioned dose is to be repeated until complete recovery.

Admitting that each case must be treated according to its merits, we think that, in order to avoid any possibilities of secondary manifestations, the dose should be kept within the limits of the scheme we have suggested.

Yours, etc.,
SCHERING-KAHLBAUM (INDIA), LTD.

YUSSUF BUILDING,
HORNBY ROAD,
BOMBAY.
4th May, 1934.

Service Notes

APPOINTMENTS AND TRANSFERS

LIEUTENANT-COLONEL W. J. SIMPSON, an Agency Surgeon, on return from leave, is posted as Residency Surgeon, Mewar, with effect from the forenoon of the 6th March, 1934.

The services of Lieutenant-Colonel C. M. Plumptre, Officiating Superintendent, St. George's Hospital, Bombay, are temporarily placed at the disposal of the Government of Madras, with effect from the afternoon of the 31st January, 1934.

The Viceroy and Governor-General has been pleased to make the following appointment on His Excellency's personal staff:—

To be Honorary Surgeon

Lieutenant-Colonel A. J. H. Russell, c.n.r., *vice* Major-General H. R. Nutt, vacated. Dated 9th April, 1934.

Major J. C. Pyper, o.m.e., an Agency Surgeon, is posted as Residency Surgeon in Kashmir, with effect from the forenoon of the 2nd April, 1934.

Major D. R. Thomas, o.m.e., is appointed to officiate as Imperial Serologist, Calcutta, with effect from the afternoon of the 6th April, 1934, *vice* Lieutenant-Colonel R. B. Lloyd granted leave.

The services of Major J. Carey are placed permanently at the disposal of the Government of the Central Provinces, with effect from the 24th March, 1934.

The services of the following officers are placed permanently at the disposal of the Government of Bihar and Orissa, with effect from the dates mentioned:—

Major H. M. Strickland, 24th January, 1932.

Major F. H. Whyte, 22nd January, 1932.

Major J. Rodger, an Agency Surgeon, is posted as Civil Surgeon, Sibi and Loralai, with effect from the forenoon of the 1st April, 1934.

In supersession of previous notification, Captain S. M. K. Mallik, an officer of the Medical Research Department, is appointed to officiate as Assistant Director, Central Research Institute, Kasauli, with effect from the date on which he assumes charge of his duties.

Subject to His Majesty's approval, the undermentioned officers who were appointed on probation in 1933 are confirmed in the following order on passing the necessary courses of instruction and on completion of one year's satisfactory service.—

Captains

W. J. Moody.

A. E. Kingston.

Captain (provl.)

B. A. Porritt.

Lieutenants

J. M. Selater.

J. D. Murdoch.

C. F. Garfit.

D. K. L. Lindsay.

D. R. Tweedie.

A. T. Andreasen.

W. S. Morgan.

M. S. Purvis.

M. E. Kirwan.

G. S. N. Hughes.

J. W. Richmond.

A. D. Barber.

The seniority of the undermentioned Lieutenants (on probn.) is antedated to the dates shown against their names:—

R. R. Prosser, 5th February, 1933.

J. Scott, 5th February, 1933.

C. J. Hassett, 5th February, 1933.

E. Parry, 15th February, 1933.

LEAVE

Lieutenant-Colonel R. B. Lloyd, Imperial Serologist, is granted combined leave, preparatory to retirement, for 2 years and 8 days, *viz.* 3 months and 8 days on average pay and 1 year and 9 months on half average pay, with effect from the 1st April, 1934, or subsequent date from which he may avail himself of it.

Notification granting leave to Lieutenant-Colonel W. L. Harnett, Professor of Surgery, Medical College, Calcutta, and Surgeon to the Medical College Hospitals, is hereby cancelled.

Major S. D. S. Greval, Officiating Assistant Director, Central Research Institute, Kasauli, is granted leave on average pay for 4 months, with effect from the 23rd April, 1934, or the date from which he may avail himself of it.

Major J. G. Bird, an Agency Surgeon, is granted under Fundamental Rules, leave on average pay for 8 months combined with leave on half average pay for 4 months, with effect from the forenoon of the 6th March, 1934.

PROMOTIONS

Majors to be Lieutenant-Colonels

R. Hay. Dated 7th April, 1934.

W. P. Hogg. Dated 10th April, 1934.

H. E. Murray. Dated 20th April, 1934.

A. H. Harty. Dated 11th February, 1934.

F. R. Thornton, m.c. Dated 11th February, 1934.

RETIREMENTS

Lieutenant-Colonel A. N. Dickson, m.c., 22nd February, 1934.

Lieutenant-Colonel C. G. Howlett, 9th March, 1934.

Captain J. F. O. Bodman, receiving a gratuity, 17th January, 1934.

Captain E. V. Claydon, with a gratuity, from 13th March, 1934.

Notes

A CONTRIBUTION TO THE PERORAL THERAPY OF DIABETES MELLITUS

The action of insulin in diabetes is a classical example of the successful treatment of disorders of internal secretion by means of glandular preparations. The disadvantage, however, that insulin can only be administered by injection, and that its action passes very quickly, induced men of research to look for a specific, which, administered orally, would bring the hormone action of the pancreas to its fullest advantage. At first only specifics whose action was insufficient were discovered. The research work of Krauss and Zondek helped to solve the difficulties. The hormone activation, brought about by the addition of a suitable electrolyte, discovered by these workers, made it possible to increase the development of the hormonal action very considerably.

It has now become possible to find as an effective mineral vitamin, an electrolyte of the right physiological composition, which actually activates the pancreatic hormone preparation in the body.

C. von Noorden has recently made mention of a method by which the sugar-retaining substance in the pancreas can be isolated. The combination of this pure and effective pancreas-hormone preparation with the new catalyst, resulted in the highly effective peroral preparation, which reduces the urinary sugar, without having any detrimental secondary effects. This preparation has been introduced under the name of Pancresalets.

In the *Munch. med. Wochenschrift* 1931/18, Tennenbaum reports about his experiments with the carbonate

combination of the decamethylendiguandin (claimed to be one of the essential constituents of Pancreasalets), and has ascertained that it has a strong blood-sugar reducing action.

It is claimed that in Pancreasalets we have an effective physiologic pancreas-vitamin preparation, which, when taken internally, quickly reduces and prevents the excretions of sugar. It must be looked upon as an advantage of this preparation that, on the one hand, it is absolutely free from detrimental secondary effects, and, on the other, that no special dose need be administered to each individual patient, as the diminution of the excretion of sugar progresses slowly and regularly.

Dr. med. Gleichmann, in the *Allgemeine Medizinische Zentral-Zeitung*, 25th July, 1933, No. 11.

TONOVAN

TONOVAN the new Schering food tonic complies with all the demands made of a preparation intended to compensate for the lack of variation in Indian diets. It contains carbohydrates—the most readily available form of energy—in a concentrated form, valuable proteins, lecithin, vitamins A, B and D and mineral salts. It is free from any artificial constituents, meat extracts or fats of any kind, and contains no colouring matter or preservatives. Its high calorific value and special content of vitamin B make Tonovan a valuable food-stuff for building up and maintaining bodily and nervous strength. It is very palatable.

BOVRIL, LIMITED

THE Thirty-seventh Annual General Meeting of Bovril, Limited, was held on 5th March, 1934, at River Plate House, Finsbury Circus, London, E.C.

Lord Luke, K.B.E. (Chairman), who presided said that Bovril sales for 1933 exceeded those of 1932.

Sir James Crichton-Browne, in proposing the re-election of the Duke of Atholl, recalled that when he was a schoolboy at Glenalmond they used to steal over to a place on the Duke's estate to taste of a delightful confection called 'Atholl brose' but 'Atholl brose' had entirely vanished from the scene, having been supplanted by Bovril.

He had been partaking of Bovril for five-and-twenty years and turned to it to-day with undiminished relish and a growing appreciation of its merits.

They were all familiar with the salient properties of Bovril; with its power of contributing to nutrition and body-building in its own capacity, and by promoting the assimilation of other foods. It was an invaluable restorative. It promptly stimulated the functions of the stomach and was, therefore, an invaluable remedy in states of shock, collapse, exhaustion and extreme debility.

Apart from its helpfulness in shock and collapse, a Bovril thermo in the motor-car might be serviceable in other ways. Every motor driver sometimes experienced fatigue and a sense of strain, which no doubt a little alcohol would dissipate, but it did so at the price of some slight diminution of attention which was always the motorist's supreme need. But a cup of warm Bovril fortified attention, and made for promptness and precision of action. It would not, as it was said of a small quantity of alcohol, postpone the application of the brake by the fifth of a second—a very minute particle of time, but sometimes of vital consequences.

LIQUID MYCOZOL

LIQUID MYCOZOL is offered as an effective agent for the treatment of skin mycoses fungous diseases commonly referred to as 'ringworm', 'athlete's foot', etc. Such diseases are caused by parasitic fungi, such as *Trichophyton interdigitale*, *Epidermophyton rubrum* and other dermatophytes. If used with ordinary

caution Liquid Mycozol does not macerate the skin but causes desquamation.

It contains alcohol, 48 per cent; salicylic acid, 2 per cent; benzoic acid, 2 per cent; chloretone (chlorbutanol), 5 per cent; malachite green, 0.01 per cent (1:10,000). It dries rapidly, and the treated skin may be noted to have a resinous feeling due to the small amount of gum turpentine present. Liquid Mycozol, when allowed to dry on the skin, will not discolour clothing.

It may be most conveniently applied to the affected area with a small soft brush or pledget of cotton. It may be applied night and morning and should always be permitted to dry before clothing is brought in contact with the treated area. At first it produces a momentary stinging sensation; following this the effect is soothing, and itching is quickly relieved. It has a drying effect which is desirable in treating moist areas since it assists in checking the spread of infection from bursting vesicles.

Liquid Mycozol should be kept tightly corked since both alcohol and chloretone will evaporate if exposed to the air.

Caution

Since this lotion contains an active keratolytic agent its use should not be continued indefinitely. The application of such agents if continued without proper caution may result in excoriation. This may be easily avoided, however, by frequent observation of the treated area, discontinuing the treatment if any untoward irritation appears.

It is supplied in bottles containing 50 cubic centimetres.

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Original Articles

GRANULOMA GENITO-INGUINALE

By V. GOVINDAN NAIR, M.R.C.P., F.R.F.S. & C.

Venereologist and Dermatologist, King George Hospital, Vizagapatam

and

N. G. PANDALAI, M.B., B.S., D.T.M.

Medical College, Vizagapatam

GRANULOMA GENITO-INGUINALE is a mildly contagious, chronic and progressive disease of unknown aetiology, characterized by granulomatous ulceration of the inguinal and the anogenital regions, showing little or no tendency to spontaneous healing; it yields to intravenous antimony therapy, but depigmented scars are left. It is auto-inoculable, affects all races and both sexes, and is endemic in many countries of the world.

The condition has numerous synonyms; the multiplicity of these denotes disagreement among workers about the real nature of the disease. All the names are open to objection. Granuloma inguinale, ulcerating granuloma of the pudenda, groin ulceration, peri-anal granulomata, all lay stress on the regional distribution of the disease. The names granuloma tropicum, granuloma pudendi tropicum, and tropical granuloma suggest a tropical limitation of the prevalence of the disease, although its occurrence in regions outside the tropics also has been widely recognized. Infective granuloma, ulcerating granuloma, and granuloma contagiosa are too indefinite to be specifically applied to any one of the granulomata. There remain only two names, chronic venereal sores and granuloma venereum, of which the latter seems to find favour with the majority of writers on this subject.

As, however, its common sites are the inguinal and the genital regions, the name 'granuloma genito-inguinale' is proposed as it is more comprehensive. It is also very desirable that all the writers on the subject should confine themselves by common consent to one name so as to avoid confusion in the matter of reference to it in the literature. In this paper the name 'granuloma genito-inguinale' is used throughout.

There seems to be some confusion between this disease and tropical or climatic bubo, probably due to the latter being also known as 'lymphogranulomatosis inguinale'. This is a distinct and separate disease which is an affection mainly of the inguinal and less commonly of the iliac and the pelvic glands.

History.—The disease was first recognized by McLeod in 1882 and described as 'serpiginous ulceration', though no specific name was given to it. In 1896, in British Guiana, Conyers and Daniels were the first to describe the condition as 'the lupoid form of so-called groin ulceration' and as a distinct disease entity. Then in 1897, Galloway, in England, reported

a case as ulcerating granuloma of the pudenda. This was followed, in 1898, by Dempwolff in New Guinea, who described it as granuloma contagiosa, having seen it among the Papuans and the Melanesians. In 1899, Maitland in Madras gave this condition the name 'chronic venereal sores'. Donovan in 1905, also in Madras, described certain intracellular bodies in smears from a month lesion and considered them to be the causative organisms. In 1911, Jackson in Australia described a kind of ulceration in the genitals and the perineum occurring in the aborigines which he had been observing since 1882. He thought the condition to be a form of syphilis in the blacks and so called it 'black pox'. In 1913, Aragao and Vianna were the pioneers in using potassium antimony tartrate intravenously in the successful treatment of this disease having been encouraged to do so by their success with this drug in the treatment of espundia. In the United States of America, the disease was first described by Grindon in 1913. Recently, Bhaskara Menon (1933) has supported the suggestion that the disease, like syphilis, may have a primary lesion which heals readily; and that it develops granulomatous ulcers later on as a secondary stage.

Geographical distribution

Cases have been reported from almost all parts of the world. Roughly speaking, the disease is prevalent in the countries lying between the latitudes of 60 degrees north and 20 to 30 degrees south of the equator. It is endemic in India, particularly south India, southern China, Italy, Spain, France, Germany, Australia, North and South Africa, practically the whole of South America, portions of Central America and 'almost all the states of the United States of America except in the inland rocky mountains section and the far western plains'. It is fairly common in the Circars as evidenced by the experience of the venereal department of the King George Hospital, Vizagapatam.

Aetiology

The aetiology is still obscure. Different observers who studied the disease at different periods thought it was a manifestation of tubercle, syphilis, neoplasm or of trophic disturbance; but there is little evidence to substantiate any of these views. In 1905, Donovan in Madras described certain bodies found inside large mononuclear cells and considered them to be the causative agent; he regarded them to be protozoal in nature. In the words of Donovan they looked 'like gigantic bacilli with rounded ends'. Markham Carter, in 1910, described them as 'bean-shaped bodies resembling the gregarine stage of a herpetomonas or crithidium'. Sibert thought them to be encapsulated intracellular diplococci. He placed them in the same aetiological relationship to the disease as the organism of rhinoscleroma to it. In 1913, Aragao and Vianna called them 'calymmatobacterium granulomatis'. Walker was inclined to regard them as intracellular capsulated diplococci, one of the Friedländer group (Manson-Bahr, 1929). Castellani and Mendelson (1929) considered the Donovan bodies as 'nosp. parasites', like proteus X19 of typhus.

In 1926, Goldzieher and Peck, after exhaustive studies, came to the conclusion 'that the aetiological agent is a pleomorphic organism which assumes the form of a bacillus or coccus. Its most typical form is that of a bacillus 1 to 6 microns in length, containing 1 to 3 inclusions which tinctorially behave like the nucleus of the cell'. They also proposed the name 'bacillus venereogranulomatis'. Though the Donovan bodies have been fairly constantly seen in the lesions by all observers they have not so far satisfied Koch's postulates; and so they cannot be accepted as the causative organism. Some consider the Donovan bodies to be only secondary organisms and the primary causative agent as yet to be discovered. Donovan bodies were observed by us in some of the cases in which smears were examined.

For the detection of the Donovan bodies smears should be taken either from the exudate or preferably from the scrapings deep enough at the edge or base of the lesion where the most advanced pathological changes are taking place. These bodies are pleomorphic and in appearance they are either coccoid or bacillary. They are generally seen as capsulated bodies within the large mononuclear cells. They may also be met with in the connective tissue cells and leucocytes and rarely in the plasma cells. Within these host cells they are seen either discretely or in groups of 15 to 20. These bodies later destroy the cell protoplasm and, rupturing the cell membrane, scatter themselves free into the tissues. They stain readily with the Romanowsky stains and are Gram negative. When stained with Giemsa's stain the capsule takes a bright red stain and the bacterium appears very dark violet. These organisms often show a constriction in the middle giving the impression that they are diplococci. In 1913, Martini succeeded in growing them in blood agar. He was also successful in inoculating mice and producing the disease in them; but he was unsuccessful with guinea-pigs and rabbits. They grow easily in Sabouraud's medium under both aerobic and anaerobic conditions and in the latter with the production of gas. The optimum temperature for their growth is that of the body; but growth may occur also at the room temperature. In litmus milk, dextrose and mannite acid is formed. They do not liquefy gelatine, but they coagulate milk. One of us (N. G. P.) isolated a similar organism by culture and by directly inoculating guinea-pigs with the tissue obtained from an active lesion. This organism was non-motile and Gram negative, staining feebly with aniline dyes. It had rounded ends and did not form spores.

McIntosh (1928) reported successful transmission of the disease to man by the transplantation of tissue obtained from a case with active lesion. He subsequently recovered Donovan bodies from the lesion thus produced experimentally. Campbell (1928) contests the view of McIntosh that granuloma genito-inguinale is caused by the Donovan bodies. He argues that in the transplanted tissue other organisms also might have been present. Campbell, after culturing the Donovan bodies in Sabouraud's medium, was unable to transmit the disease by inoculation of the culture into laboratory animals or human beings, including himself. But many workers including one of us (N. G. P.) have been able to produce in the laboratory animals a nodule or an abscess at the site of inoculation with material from an active lesion and to demonstrate the Donovan bodies in the lesions thus produced. In the course of a week these lesions break down discharging pus and heal spontaneously in about two to three weeks. But so far typical granulomatous lesions have not been produced by any of the workers, either in animals or in human beings, inoculating them with the Donovan bodies obtained from culture or from an experimental abscess. Until this is done successfully, Donovan bodies cannot be accepted as the causative agent.

Race, sex, and age incidence

Race is said to have no influence in the occurrence of this disease. Cases have been reported in all races, but the black races seem to be more susceptible than the white. In America, the disease is more common among the negroes, and some observers think the greater incidence in them is due to lack of personal hygiene. In India, it is more common among the Hindus.

In our series of 73 cases 72 were Hindus (all Telugus) and one Mohammedan (Bengal); in Bhaskara Menon's series of 61 cases 4 were

Mohammedans. At the same time, it should not be forgotten that the Moslem population in this part of the Circars is very small. Madras has a proportionately larger Moslem population and that seems to have been reflected in the greater incidence of the disease among the Mohammedans in Bhaskara Menon's series. Moreover, the Madras cases were drawn from all over the province. In this connection, it is interesting to note that the Mohammedans practice circumcision in early childhood. Wolff also has reported that the disease has not been observed in the Arabians with whom also this practice obtains. There were no Anglo-Indians nor Europeans in either series.

The disease is much more prevalent during the period of early adult and middle age (see table I). It is rare in persons of over 50 or under 15. Almost all the cases in our series (86.3 per cent) were between 18 and 40.

TABLE I
Age and sex incidence

Age period.		15 to 20 years.	21 to 30 years.	31 to 40 years.	41 to 50 years.	Total.
Males	..	5	16	10	4	35
Females	..	6	25	6	1	38
TOTAL	..	11	41	16	5	73

This table brings out another factor, i.e., that the disease is more common in females between 15 to 30 years of age and after that it is more common in males.

The youngest case in the literature was that reported by Shattuck, a male child of 2 years who was circumcised while he was a month old. Cases have also been reported in children of 6, 13, and 14 years. The oldest case on record was in a man of 67 years of age. According to some it is more prevalent in one sex and according to others in the other sex; the majority of observers think that the disease has preference for the female sex, and in our series also the preponderance was in women.

The disease appears to be more common in women than in men, at least in India; for women here do not present themselves for treatment in the general hospitals so readily as do men, especially for lesions in the genitals. If the proportion of men and women attending a venereal clinic is worked out it will be seen everywhere, even in the advanced European countries, that men predominate over women, though both should be affected in approximately equal numbers. In India, where there are not only untouchables but also unseeables (*Gosha* women), if according to hospital statistics the number of men and women suffering from this disease be equal, or even if the number of

women be only slightly less, it is safe to infer that the incidence in women is considerably higher than the statistics show.

The disease is not inherited and no case of congenital or inherited granuloma genito-inguinale has so far been reported. In Wilson's (1930) series of 14 pregnant women suffering from the disease none gave birth to a child with the disease. There were two patients in our series who were pregnant and gave birth to apparently healthy children.

No seasonal variations in the incidence of the disease are noted.

The disease is generally met with in the poorer classes. All our patients were from this class. Other conditions that may influence the onset of the disease are insanitary surroundings, overcrowding, lack of personal hygiene, promiscuity and polyandry.

The disease is endemic in many parts of India particularly in the south; so far it is not known to have prevailed as an epidemic form in these parts. de Vogel (1928) in Dutch Guiana has reported the existence of granuloma genito-inguinale in an epidemic form amongst the Marindene. He estimated that 12 to 15 per cent of the population had been affected. He also thought that the disease had been endemic there for a long time, and has only recently taken the epidemic form due to the improved communication between the villagers and the loose habits of the people, e.g., wife prostitution. Kalthofen (1928) has also reported the existence of the disease in epidemic form amongst the Kaja-Kajas of South New Guinea since 1915. It has been successfully combated since.

Transmission.—How the disease is transmitted from one individual to another is not definitely known. *Pediculus pubis* has been mentioned as a possible vector. Infected clothes, finger nails and the barber's common razor should also be thought of as other modes of transmission. All are agreed that it is infectious and mildly contagious. Most authors presume that the disease is a venereal one and transmitted by sexual contact, though prolonged contact, according to some, is required. The view of sexual transmission is advanced for the following reasons :—

(1) That in many cases a history of sexual exposure before the onset of the disease can be obtained. But no one seems to have gone far enough, to find out if the other party was suffering from the disease at the time of exposure. Ross and Kaup traced the source in the case of four men to one and the same individual; but they failed to report if the latter was actually suffering from the disease at the time. This is the only instance in which more than one person is reported to have contracted the disease from the same source.

(2) That the disease is more common at an age period when the sexual activity is at its height. But cases are reported in children sexually inactive and not exposed; for example, Shattuck's case in a male child of two years, McLean's case in a male child of six years, and Sabella's case in a girl of six years with an intact hymen.

(3) That the commonest site of the disease is the genitalia; but the granulating ulcer is equally commonly met with also in other parts of the body without the implication of the genitalia.

Points against venereal origin are :—

1. The consort, or in the case of married people the other partner, always escapes. Only one single case of a husband and wife being treated together for this

disease is so far reported. In Wilson's 14 cases in pregnant women, the husbands of all the fourteen were free from the disease. Maciel (1929) reported a case of a man suffering from the disease for four years and living all the time with his wife, who conceived and gave birth to a child that was free from the disease for the four months under observation.

In our own series, 51 were married and none of their partners according to the patients had the disease. But three women gave a history of their husbands having had some kind of ulcer in the genitals. It is very easy to get a history of exposure in the case of men, but in the case of women such a history, at least in our experience, is not easily obtained. Women suffering from the disease have sworn to us that they were never exposed but had only marital relations with their husbands, who were free from the disease.

McIntosh failed to see the disease develop in persons who were given many chances of intimate contact by sexual acts with infected persons; these experiments were conducted in the Memphis General Hospital under direct medical supervision. The existence of an individual susceptibility has been invoked to explain this failure.

2. The preponderance of the disease in women. If the disease is infectious and of venereal origin, both men and women should be equally affected. If the analogy of venereal disease is taken, of those attending venereal clinics, men predominate over women.

3. In spite of the greater prevalence of the disease in women, the disease is not as commonly seen as the other venereal diseases in professional prostitutes.

4. The comparative rarity of the disease as against the wide prevalence of other accepted venereal diseases.

5. The comparative frequency of extra-genital lesions without a genital focus.

6. The occurrence of the disease in those who are not sexually exposed and in sexually inactive children who were never exposed. In our series there was a case of a young unmarried man of twenty who, though never exposed, had the ulcer on both sides of the anal margin. Another patient of our series developed the disease 16 years after amputation of his penis. In this case it is needless to say that there was no question of sexual intercourse.

7. That granulosomatous ulcers develop after trauma, particularly after operation for bubo, circumcision, piles and anal fissure.

8. The absolute freedom from infection of the internal genitalia.

If the disease is venereal in nature why should the external genitalia alone be affected? The disease generally starts in women in either the labia majora or minora, more often in the latter, and then spreads to the skin of the labia or to the muco-cutaneous junction, or to the vaginal introitus and to a slight extent into the vaginal wall. We have not come across any reported case nor any one in our series with the history of the disease making its appearance first in the fornices or on the cervix uteri. Extension of the disease to these structures has not been reported, nor did it occur in any of our series though some of the cases were of long duration, lasting from 2 to 6 or even 15 years. In this connection, it is worth noting that the lesions are fairly frequently seen on the prepuce and glans penis. If granuloma genito-inguinale were of venereal origin, at least a small percentage of the lesions should be on the cervix; but no such case is on record.

In conclusion, we are inclined to think that the disease cannot be taken to be of venereal origin until more convincing proof is forthcoming.

Pathology

Most of the cases start as a papule or a small nodule; the surface epithelium of these excoriates or erodes and an ulcer is formed. Some have

observed a thin greyish membrane covering the ulcer. Such a membrane was observed in one of our cases. This membrane can be easily scraped off, when the usual pink ulcer underneath is exposed. The ulcer itself is red or pink and presents the appearance of granulation tissue, studded all over with papules or small nodules. Therefore its surface is not even, but presents elevations and depressions, the former having been aptly described as 'mountains in a relief map'. The edges are not undermined and there is no induration in the early cases. Particular attention is drawn to this fact because the textbooks describe the ulcer as having a hard and indurated edge. In our experience, the induration is found to be present only in chronic cases of long standing. We have also come across cases which show no induration in the parts that are recent but induration in the older parts of the same ulcer. The same is the case even with the scars; those of recent ulcers are soft and supple while those of chronic ones are hard and unyielding. The normal tissue beyond the edge of the ulcer appears in some cases to be a little raised above the surface; this is probably due to infiltration or exudation. In a few cases, 3 or 4 in our series, the lesions were definitely raised above the surrounding skin, and were ribbon-like in appearance. The ulcer is soft to the feel and bleeds easily. There are no areas of suppuration, caseation, nor necrosis. No purulent discharge is present even when the ulcers are extensive. The ulcer is dry in a few cases, but more often it is moist, exuding a thin watery, or blood-stained and sticky, fluid—with a peculiar unpleasant odour of its own—in which the Donovan bodies can be demonstrated. In a fair proportion of cases the exudation is so profuse as to be a source of nuisance to others while it is a source of inconvenience to the patient. It wets the clothes of the patient; the skin around the ulcer gets sodden; and one gets the unpleasant odour on approaching the patient.

The ulcer is very superficial being only a few millimetres deep. The subcutaneous tissues are invaded only rarely. It is not definitely known whether the infection spreads through the lymphatics. Goldzieher and Peck claimed to have seen the Donovan bodies in a regional lymph node which was apparently normal. The lymphatic glands are enlarged only in a few cases while in the great majority they are not. In our series of 73 cases only 11 (15 per cent) showed definite enlargement; and in another 13 the regional glands were just palpable. In this country where many persons walk barefooted and where filariasis is fairly common, it is not unusual to find palpable inguinal glands without any apparent lesion. It is evident that lymphatics, particularly of the genitalia when the lesion is situated there, are affected producing a pseudo-elephantoid condition of the skin of the

surrounding areas (figure 1). In the case of males, the prepuce and the skin of the penis or the scrotum or both may become thickened. In the case of females, the labia may become



Fig. 1.—A case with elephantoid condition of the labia with excessive scar formation in and around the perineum: this case remained refractory to tartar emetic treatment for a long time.

thickened, hard, indurated and granular and at times studded all over with large nodules. In some cases a mass of hypertrophied nodular tissue is seen hanging from the crura of the clitoris as a pedunculated tumour. The pseudo-elephantoid condition is much more common in



Fig. 2.—A case with extensive ulceration and deformity with complete occlusion of the vagina: duration 15 years.

women; in our series 16 cases were in women and 2 in men. The ulcers are single or multiple; and they enlarge by continuity or contiguity of surface and by auto-inoculation. They spread very slowly taking many months for the development of a good-sized ulcer.

On healing a depigmented scar is left. The scars of recent ulcers are soft and yielding, but the scars of chronic ones, though soft at the time of healing, become sclerosed in course of time and are then hard and unyielding (figure 2). It is common to see an ulcer with one portion healing and another portion advancing. The healed scars may easily break down even during the course of active treatment. In the females, though the ulcers are superficial, extensive damage may be done to the external genitalia resulting in deformity, disability and even in the occlusion of the vagina (figure 2). In one of our cases the vulva was a mass of scar tissue without the labial cleft, necessitating the operation of hysterectomy to prevent the retention of the menstrual fluid (figure 3). Ulceration of the rectum and the urinary meatus results in stricture of the respective parts. In males, when the ulcer is all around the root of the penis the stem of the penis, becomes involved in the ulcer and cannot be mobilized. On healing, the glans penis alone is visible in such cases (figure 4).



Fig 3—A healed case showing complete destruction and obliteration of the external genitalia; this patient is periodically attending the hospital for dilatation of what was once the urinary meatus. Though long standing, the scar is still soft, supple and depigmented.

Histopathology

It is generally accepted that there is nothing characteristic histologically to warrant a diagnosis from a microscopical examination of the section alone. Still there are certain features which may enable an experienced pathologist to identify the condition. Granuloma genito-inguinale, as the name implies, is a granuloma and the initial lesion is a papule or a small nodule. If a section made from an early nodule

or from the edge of the ulcer be examined it will be found to be made up of nodules or



Fig. 4—A case in which the penis is embedded in the ulcer: the glans alone is visible outside.

masses of nodules which consists of an infiltration of cells into the corium of the skin. The essential histologic characteristic is cell infiltration. A variety of cells is seen, chief among them being polymorphonuclear leucocytes, lymphocytes, connective tissue cells, large mononuclears, and plasma cells. There is an accompanying vascular dilatation and engorgement; the papillae of the skin are elongated eight to ten times their normal size; inter-papillary plugs also become very long; and the superficial layers of the epidermis are absent, being denuded by excoriation or scratching by the patient. The deeper layers of the epidermis also proliferate thus adding to the exaggerated size of the papillae already mentioned. This papillary elongation and cellular infiltration are by no means characteristic, as these are also met with in other chronic ulcerative conditions of the skin. Though there is an abundance of newly-formed granulation tissue with its concomitant new capillaries, evidence of hæmorrhage into the tissue is very rare. In the mononuclear cells, clumps of Donovan bodies are seen. As the lesion becomes chronic the inflammatory reaction spreads deeper into the skin and we see many lymphocytes and plasma cells, but few polymorphonuclears in it. Giant cells are conspicuous by their absence; there is no evidence of endarteritis obliterans; there are no areas of suppuration nor caseation, and there are no tubercle bacilli present. Although granuloma genito-inguinale has a striking resemblance to

rhinoscleroma, the characteristic large cells of Mikulicz and the bacillus of von Friesch, associated with the latter condition, are absent in this. In very chronic cases large masses of non-pigmented fibrous tissue are seen. When the ulcer begins to heal the cellular infiltrate is absorbed and its place is taken by fibrous tissue. Microscopic sections also show the presence of a few hair follicles and sweat glands and these are thickened and infiltrated with round cells. At the periphery of the lesions the cellular infiltration extends to a short distance into the normal skin; this is the evidence to show that the disease is extending to the surrounding tissues which appear normal to the naked eye.

Incubation period

This has been differently stated by different workers. It has been claimed by some observers that the incubation period is two to eight days after sexual contact; others state that it may extend to twelve weeks; the extremes thus are two days and twelve weeks. In our series, judging from the date of the last illicit sexual intercourse to the date of the first appearance of the lesion, the incubation period ranges from one day to twelve weeks the average being eighteen days for twelve cases. But these observations have been made on the assumption that the disease is venereal and is transmitted by sexual intercourse. Until the mode of infection is definitely known, it is not possible to determine the period of incubation.

Modes of onset.—Many observers think that the disease starts as a papule, small nodule or an ulcer, or subsequent to trauma, particularly surgical trauma. The following are the modes of onset in our series as noted from the history of the patients :—

1. As a superficial ulceration.
2. As a circumscribed nodule or papule which later on ulcerates and spreads.
3. As a post-operative development.

(a) After circumcision a typical granuloma develops on the line of the incision (figure 5). Another of our patients came under observation for a few small ulcers on the glands and the mucous surface of the prepuce. Clinically, these ulcers appeared to be non-syphilitic; and no *Spirochaeta pallida* was found in the exudate on examination under darkground illumination. A dorsal slit was first made preparatory to circumcision and when the ulcer had almost healed circumcision was completed. But the sutures did not hold, and in three days they had to be removed. In the line of incision the typical ulcer developed which readily yielded to tatar emetic intravenously.

(b) After operation for piles or anal fissures.

(c) After operation for inguinal bubo

4. As an intolerable itching followed or accompanied by the eruption of a crop of papules; this is more common in women. The incessant scratching leads to the formation of multiple superficial ulcers which slowly take on the granulosomatous character.

These small ulcers coalesce and form large ones. In these cases the ulcers are spread rapidly by scratching. When papules are present they erode and then ulcerate, or they fall off leaving small ulcers with a punched-out appearance. In the words of one of our patients, small bits of tissue (papules) about the size of a split pea used to fall off on scratching, leaving small ulcers.



Fig. 5.—A case with history of circumcision preceding the onset of the disease.

TABLE II
Modes of onset

Number	Mode of onset	Number of cases	Percentage
1	Superficial ulceration	17	23.3
2	Small nodule or papule	14	19.2
3	Post-operative		
	(a) after circumcision	11	15.1
	(b) after operation for piles or anal fissures.	3	4.1
4	Preceded by intolerable itching.	12	16.4
5	Bubo after ulceration or after operation.	5	6.8
6	Vesicle ..	3	4.1
7	Undetermined ..	8	11.0
TOTAL ..		73	100

Sites of the lesion.—The commonest sites are the external genitalia, the groin and the pubis, the perineum and the peri-anal region, the mouth,

lips and the palate. The disease has been reported to occur in all regions of the body except the scalp. The following sites are also mentioned in the literature:—Nose, ears, pharynx, larynx and pillars of the fauces, cheeks, gums, tonsils, face, forehead, mastoid region, neck, chest, lower part of abdomen, back over the kidney regions, sole of the foot and fingers.

TABLE III
Sites of lesions in our series

Site of lesion	Males	Females	TOTAL
Genitals ..	22	17	39
Genitals, perineum and anus.	1	8	9
Genitals and groin ..	2	2	4
Genitals and perineum ..	0	5	5
Genitals and anus ..	0	2	2
Genitals, perineum and groin	1	1	2
Genitals and mouth ..	1	2	3
Groin ..	3	0	3
Groin and mouth ..	1	0	1
Groin, perineum and anus.	1	0	1
Perineum ..	0	1	1
Anus ..	2	0	2
Buttocks ..	1	0	1
TOTAL ..	35	38	73

Symptomatology.—The disease usually makes its appearance insidiously without any



Fig 6.—A case showing the onset of the disease as an ulcer on the glans penis.

premonitory symptom or constitutional upset, but two of our patients gave a history of rigors followed by high temperature at the time of the appearance of the vesicles which burst and formed into typical ulcers.

The disease as stated above often starts as a papule, small nodule, vesicle or ulcer on the prepuce or the glans penis (figure 6) in the case of males and on the labium minus in the case of females. The perineum in females (figure 7) and the peri-anal and inguinal regions in both

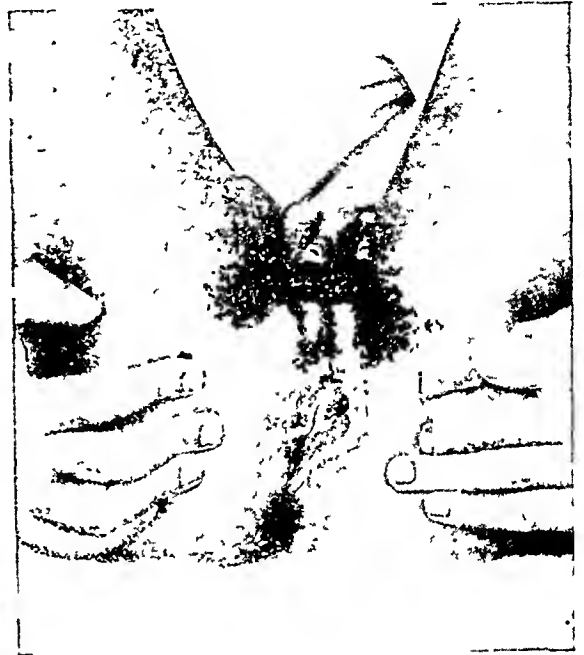


Fig. 7.—A case showing the onset of the disease on the perineum preceded by intolerable itching and a crop of papules: note the absence of induration of the scar tissue.

the sexes are other common sites. The ulcer is superficial and may be single or multiple. The progress of the lesion is very slow, taking weeks to months to develop to the size of a rupee. It spreads peripherally, by auto-inoculation to the opposing surface and also by infected clothes and finger nails. It extends over large areas and in places is destructive to the deeper structures. Its surface is generally moist, but occasionally dry. A fair amount of thin, watery, or blood-stained and sticky, fluid with a characteristic unpleasant odour exudes from the surface. In a few cases this exudation is continuous and profuse so as to wet the patients' clothes. In men the ulcer in the glans penis and the prepuce may extend to the stem and the root of the penis, to the pubis, the groin and the lower abdomen; and from the groin it may spread down the thighs; from the root of the penis to the scrotum or all around the root of the scrotum, as a band as in one of our cases, and downwards into the perineum, peri-anal region, anus, and rectum; from here it may

spread to the buttocks. The urinary meatus is also at times involved and in one of our male patients the urethral opening was at the corona, as a result of the lesion spreading up into the urethra. In the case of women, starting on the labium minus, the disease may spread by continuity externally to the labium majus and from there upwards to the mons veneris (figure 8); or downwards to the perineum, peri-anal region and

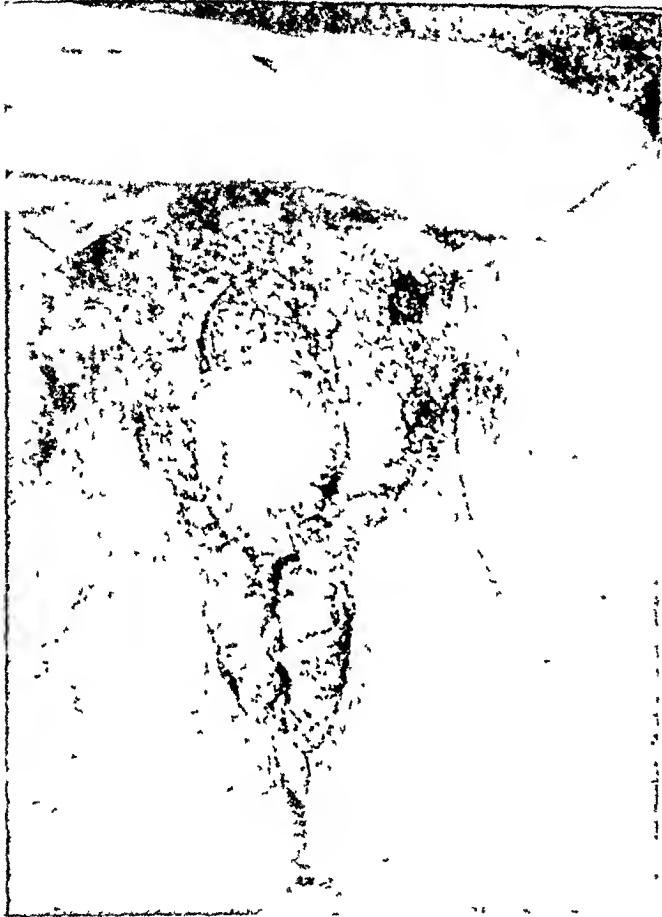


Fig. 8.—Extensive lesion in a pregnant woman

parts about it as in the males, or it may spread internally to the vaginal introitus and for a short distance up the vaginal wall. Extension to the fornices or the cervix is practically unknown. The clura of the clitoris and the vestibule are other sites of origin. When the vestibule is affected the urethra also gets involved resulting in stricture of the urethra. The involvement of the anus may result in recto-vaginal fistula or stricture of the rectum. A third mode of spread, by the blood stream, has been reported by de Vogel. In the cases with acute onset it is surmised that the large mononuclear cells laden with the Donovan bodies get into the blood stream disseminating the disease. Metastatic lesions have been reported in the internal organs, such as the liver and the lungs. In the case of Thierfelder, the pus from the liver abscess showed the Donovan bodies.

Like condylomata lata, this disease seems to have a special preference for moist, warm surfaces such as the vulva, the perineum, the scrotum, the folds between the thighs and the

scrotum, the cleft between the buttocks and the anal margin. When hairy parts like the groin or the pubis are affected, the hair falls off as the ulcer develops and spreads. Simultaneously with the peripheral spread healing also occurs in other areas with the formation of soft and uneven scar tissue that breaks down readily. In some cases, the scar formation is so rapid as to bridge over the active ulcers with the formation of tunnels and sinuses. In one of our cases such a condition developed in the groin forming sinuses that necessitated opening up later. The newly-formed scar tissue may easily break down even during active treatment. Some time after complete healing the scars become hard, sclerosed and depigmented appearing as white or lighter coloured patches. In both sexes the regional lymphatic glands are enlarged in some cases (15 per cent in our series), markedly in a few and slightly in a few others. In the large majority of cases the regional lymphatic glands are not enlarged. Sometimes cases are seen with extensive ulceration, but with no lymphadenitis or lymphangitis; and these cases have no purulent discharge, though the ulcer is not kept clean by any antiseptic dressing nor even by simple washing. When the lesion is on the genitals a pseudo-elephantoid condition is sometimes noticed. This may be due to any or all of the following causes:—The actual involvement of the lymphatics in the disease process; the blocking of the lymphatics with masses of large mononuclear cells packed with the Donovan bodies; or the obliteration of the lymphatics in the process of formation and contraction of the scar tissue. As already pointed out this hypertrophy is almost exclusively seen in the genitalia and in the great majority of cases in the female. It looks as though the pseudo-elephantoid condition is not the sequel of the sclerosing of the scar tissue only, as this hypertrophied condition is found present in very early cases also, before the formation of any scar tissue. Again, cases of long standing are found with very hard and sclerosed scars but without any pseudo-elephantoid condition. Further, cases have come under our observation with superficial ulceration of the labia which are hypertrophied and also those with sclerosed protuberant masses of scar tissue in the perineum and extending to the buttocks, but without any hypertrophied condition of the surrounding skin.

Almost all workers in this field report that granuloma genito-inguinale is a symptomless disease and that the patient seldom complains of anything except the mental uneasiness caused by the presence of the ulcer. Our experience, on the contrary, is that most of our patients complained of one or more of the following symptoms: pain, burning sensation, intolerable itching or a peculiar sensation as of the crawling of worms on the skin. Pain is a more-or-less common symptom. Sometimes it is so severe as to necessitate the ordering of a sleeping

draught. In those cases in which the anus or the peri-anal region is affected, pain during defaecation was more-or-less constant. Besides, in all those cases the patients complained of difficulty in sitting. The mouth lesions cause pain and difficulty in swallowing. One of our patients, a woman with ulceration of the genitalia of 12 years' duration and pseudo-clephantoid condition of the labia, said that sexual intercourse became painful for her from two years after the onset of the disease. Burning during micturition is another symptom when the urethra is involved. Mechanical difficulty in walking is experienced, especially in extensive ulceration of the genitalia, the perineum, the peri-anal region and the groin. This is particularly seen in women who develop a peculiar gait. Intolerable itching is another common complaint particularly among women. Some have it throughout the course of the disease till the ulcer begins to heal; while others complain of it at the actively-spreading stage only, and scratching, the unavoidable concomitant of itching, undoubtedly helps the spread of the ulcer.

Recurrence is common and in our series 18 patients have returned with recurrence, nine females and nine males. The new lesion occurs in the same old site, and is due to the breaking down of the scar. Such recurrences may take place more than once. In our series we have seen two and three relapses. These recurrent cases do not heal so readily as the primary ones.



Fig. 9.—Secondary infection of the mouth involving the whole of right half of the palate and upper lip.

Sequelæ

These depend on the site of the lesion. If in the prepuce, glans or stem of the penis only a scar results, at times, with a pseudo-clephantoid condition of the skin of the penis and the consequent deformity and impaired function. If the condition is present all around the root of the penis the latter gets embedded in the ulcer as in three of our series and it becomes immobile resulting in deformity and loss of function (figures 4 and 10), if at the peno-scrotal junction, a pseudo-clephantoid condition of the

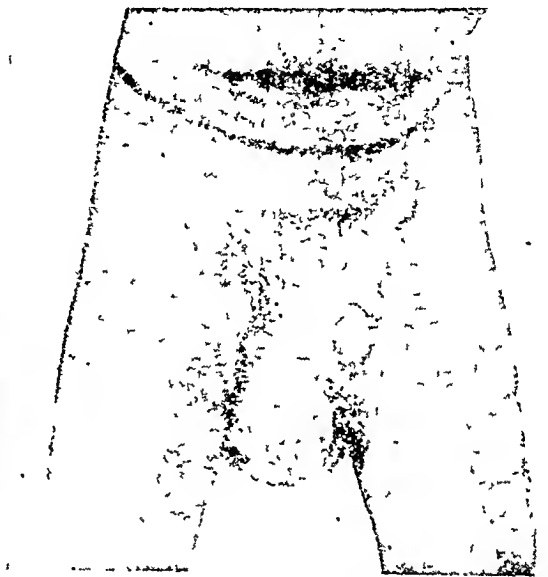


Fig 10—A case of twenty years' standing, the penis is embedded in the scar

scrotum may follow. Involvement of the urethra or the anus may result in stricture. In the other regions, contraction of the scar tissue produces deformity. Deformity due to the destruction and the contraction of the scar tissue and other causes mentioned above may result in pseudo-clephantoid condition of the labia, forming at times a nodular tumour-like mass hanging from the crura of the clitoris barricading the vaginal opening thus causing deformity and loss of function. Painful sexual intercourse, stricture of the vagina and recto-vaginal fistulae are other sequelæ in women. Pregnancy aggravates the condition; while its termination tends to ameliorate it. Wilson, who has reported fourteen cases in pregnant women, thinks that pregnancy ends in premature labour in a fair proportion of cases. In our series, there were two pregnant women both of whom had premature labour. It is stated in some textbooks that women are rendered sterile by this disease. This statement is not supported by the available statistics, nor by any theoretical considerations. Non-conception as an indirect result of the disease is more probable; but this is due to mechanical causes and is seen only in those with deformed and distorted or obstructed genitalia.

disabling normal sexual intercourse. In our series there were four women whose history definitely proved that women are not rendered sterile by the disease. The same is the case in Wilson's series of pregnant women with the disease. Unfortunately, Wilson has not reported whether these women were suffering from the disease when they conceived.

Case 1.—A woman, who had had seven full-term deliveries of which three children had died and four were alive and well. The ulcer started for the first time during her first pregnancy ten years ago; and at no time thereafter did it completely heal. The patient was first seen during her eighth pregnancy when she had a granulomatous ulcer of the whole of the perineum extending to the lower third of a hypertrophied left labium.

Case 2.—A married woman aged 25 years with a history of two previous pregnancies. In her the disease first started on the right labium majus as a vesicle, preceded by intolerable itching; it ulcerated and slowly increased in size. After two or three months she became pregnant for the third time and was seen first in January 1933 when she was about three months pregnant. At the time of admission she had a raised granulomatous ulcer extending from the symphysis pubis along the inner borders of both labia majora on both sides down to the anus; and on the left side there was another ulcer extending up from the lower third of the left labium majus to the left groin (figure 8). The inguinal glands were not palpable. She was given 32 cubic centimetres of a two per cent tartar emetic solution intravenously in 16 injections and was discharged on 8th March with the ulcers completely healed. She was advised to continue the injections and come back for confinement. She returned on the 6th July with ulceration of the labia which were hypertrophied and nodular. The scars in the perineum also had broken down. In addition there was a nodular hard mass of about the size of a lime hanging from the prepuce of the clitoris. This time she had a premature labour; and the delivery was instrumental, necessitated by stricture of the vagina and hard unyielding nature of the tissues.

Case 3.—A young married woman of 20 years of age. The ulcer first started during the sixth month of her first pregnancy and after confinement the ulcer is said to have healed with some injections. She became pregnant for the second time; and three months after confinement she had very bad itching which was followed by the development of the present ulcer.

Duration.—Before the patients came under our observation the ulcers were in existence for different periods in different persons, the extremes being eight and ten days at the one end and twenty years at the other. The average duration was about two and a half years from the sixty-six of our cases in which the duration of the disease could be elicited with any degree of accuracy. Of these sixty-six cases the duration in twenty-two was under one year; in eleven of one year; in three of one and a half years; in eight of two years; in twelve of three years; in one of four years; in two of five years; in two of six years; in one of ten years; in two of twelve years; in one of fifteen years and in one of twenty years.

Diagnosis.—This depends upon the characteristic granulating nature of the ulcer with slow development and chronic course; the demonstration of the Donovan bodies from the scrapings

of the ulcer; the absence of response to the treatment for the other ulcerative conditions and the healing of the ulcer on treatment with tartar emetic. Granuloma genito-inguinale may be mistaken for a variety of conditions occurring in the same sites; the points for differential diagnosis for some of these are summarized below :—

Syphilis.—Primary sore. This starts as an abrasion or papule which soon erodes and forms an ulcer. The ulcer is painless and has a red areola all round. The edges are hard, indurated and the base is built up. The regional lymphatic glands are enlarged with the characteristic hard India-rubber feel. The ulcer does not bleed readily and the serum exuding from the ulcer shows *Spirochæta pallida*. The sore heals spontaneously even without treatment.

Secondary syphilis, mucous patches or condylomata lata. In these cases there is a history of the primary sore with other secondary lesions in other parts of the body such as sore throat, general adenitis, and a positive Wassermann reaction of the blood. *Spirochæta pallida* can be demonstrated in the serum exuding from the lesions that react readily to anti-syphilitic treatment. Tertiary syphilis—broken-down gumma. The edge of a gummatous ulcer has a characteristic punched-out appearance with a sloughy base resembling wash-leather, while the patient may show other evidence of syphilis and may give a helpful history of having had lesions of primary or secondary syphilis. Further, in the large majority of cases the Wassermann reaction of the blood will be positive. Response to the anti-syphilitic treatment is yet another distinguishing feature.

Chancroid—soft sore.—This has an acute onset within a day or two after exposure and the ulcer is very painful, red and angry-looking with undermined edges. It spreads rapidly. The regional lymphatic glands are enlarged and painful with periadenitis and lymphangitis, and there is a tendency to suppuration. Smears taken deep from the ulcer show the Ducrey's streptobacillus, and the intradermal test with the specific antigen is positive.

Lymphogranulomatosis inguinale.—This condition may simulate granuloma genito-inguinale when the bubo has broken down with the formation of sinuses. It is ushered in with malaise, headache and fever and with a painful enlargement of the inguinal glands that suppurate and break down into an ulcer with sinuses. Extension to the pelvic and the iliac glands may also occur. Frei's intradermal test gives a positive reaction.

Malignant ulceration.—Of the groin and the genitalia. This condition is not uncommon. The difficulty of diagnosis from this is real at times, as even experienced pathologists may have difficulty in distinguishing sections of granuloma genito-inguinale from epithelioma. The malignant ulcer spreads more rapidly with lymphadenitis and does not respond to antimony treatment. Age also will be of some help, as the age for cancer is above 40, whereas the very large majority of cases of granuloma genito-inguinale occur below 40.

Tuberculous ulceration.—This is confined more or less to the pudendum and is pale with undermined edges. Biopsy will show areas of caseation, giant-cell systems and tubercle bacilli. In doubtful cases animal inoculation may be resorted to.

Yaws.—This disease is common in children under puberty and the initial lesion in 99 per cent of cases is extra-genital. It yields to arsenic therapy readily; while antimony has no effect on it.

Oriental sore.—This also affects the skin and the mucous membrane; and it yields readily to antimony compounds; but the diagnosis is not very difficult. Oriental sore affects the exposed parts; whereas granuloma genito-inguinale is an affection of the covered parts of the body with a predilection for moist warm places. The leishmania parasites are seen in oriental

sore, as against the Donovan bodies of granuloma genito-inguinale. Oriental sore is more frequently seen in children while the granulomatous condition is more common in the adults.

Elephantiasis.—Because of the pseudo-elephantoid condition often occurring in granuloma genito-inguinale, it may be mistaken for the real elephantoid condition due to filaria. But the clinical picture of elephantiasis is distinctive.

Blastomycosis.—This condition has a tendency to crust formation and the exudate from the ulcer is thick and purulent. The microscopical examination of the exudate will reveal the budding yeast-like cells and a culture may show the mycelial form.

Rhinoscleroma.—It is primarily a disease of the mucous membrane of the pharynx, the larynx and the nose. Mikulicz cells can be demonstrated and the bacillus of von Friesch can be cultured from the discharge. Any treatment including the application of radium seems to be ineffective.

Prophylaxis

Until the nature of the causative agent and the mode of transmission are definitely determined anything done by way of prophylaxis can be only empirical. With our present knowledge, the only useful prophylaxis consists in segregation and the early and effective treatment of the afflicted; and the improvement of general sanitation and hygiene.

Treatment

General. In the early stages and in patients with small ulcers ambulatory treatment is sufficient. When the ulceration is extensive and when there is difficulty of locomotion patients should be hospitalized. As there are no constitutional symptoms no general treatment is indicated. But those with secondary anaemia may be given iron and arsenic either by mouth or hypodermically.

Special. In the earlier days, surgical interference was considered the only effective and successful method of treatment. Excision was done with or without cauterization and a good margin of normal tissue was also removed with it. But the resulting scar tissue often used to break down subsequently. McCord was the first to use x-ray therapy for this condition. Sequiera next tried the rays in a case of his. Fairly extensive trial was given to röntgenotherapy in the Government General Hospital, Madras, with some amount of success. In 1913, Aragao and Vianna introduced intravenous therapy with the injections of potassium antimony tartrate in the treatment of this disease. These injections proved very successful and still form the mainstay of treatment. It is difficult to accept it as a specific for this condition, as success is not universal. The ulcers, unless very chronic, heal readily but relapses are common. In the early cases complete cure can be assured practically, as recurrences are rare. Even in long-standing cases when they come under treatment for the first time the initial improvement is satisfactory. In a small percentage of chronic cases, 4 in our series of 73, the ulcer improved under treatment with antimony injections but

only up to a certain stage when the condition became stationary or even worse. Such cases are referred to as antimony-fast, on analogy to the arsenic-fast cases in syphilis. These resistant cases, some of them at any rate, react to non-specific protein therapy. T. A. B. vaccine or Dmlecos (Ducery's bacillus) vaccine intravenously in increasing doses are useful for this purpose. The resistance to antimony disappears and thereafter the ulcer begins to yield to it. The ulcer which was indolent, pale and unhealthy shows a marked change for the better even the very next day after the protein shock; it becomes clean, red and healthy and heals rapidly. But a very small percentage of cases remains refractory to treatment even after the shock. Potassium antimony tartrate is usually given intravenously as a one- or two-per-cent solution in normal saline or five-per-cent solution of glucose. The injections are repeated regularly on alternate days. The dose depends upon the individual tolerance. Coughing fits during or immediately after the injection and pain in the joints 6 to 12 hours after the injection are the usual signs of intolerance. When cough is noticed the dose for the next injection should be reduced. When pain in the joints appear, interrupt the treatment for a couple of days and after the pains have disappeared treatment can be resumed. Another rare complication is jaundice. When this occurs further treatment should be stopped and the usual treatment for jaundice carried out. Of late, pentavalent compounds of antimony are used instead of the trivalent tartar emetic. The commonly used preparation of this class in this country is urea stibamine, which is reported to be more efficacious than tartar emetic. Fouadin, another organic compound of antimony, is under trial in this disease (Williamson *et al.*, 1933). It is too early to give an opinion about its efficacy. Diathermy, radiant heat and application of radium are other treatments recommended.

Local. Any tried antiseptic dressing is all that is necessary. Manson-Bahr recommends the application of an ointment containing 1 per cent antimony as a dressing for the ulcer for two hours to be followed by boric ointment. This local treatment is very painful besides being messy; it is devoid of any reasonably good effect, and so it is better avoided.

Prognosis

This is good as far as life is concerned. Most of the cases, even if untreated, go on for a long time without any constitutional symptoms except a slight secondary anaemia. Though not a fatal disease, it causes serious annoyance and misery to the patient. In very rare instances death may result from extensive ulceration involving the subjacent viscera, as in a case reported by Rice. There was one death in our series. It was a case of a woman with

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A NOTE ON THE TREATMENT OF INFECTIVE GRANULOMA WITH 'FOUADIN'

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IN the treatment of this condition, the specific action of antimony compounds has been recognized for over two decades, but the tendency to frequent recurrence, and the development of antimony-fastness of the recurrent lesions, have been annoying to the tropical venereologist. Further, the patients with recurrent granulomas quickly exhibit a toxic intolerance to the particular drug employed. On account of the great tendency of the lesions to break down, the treatment should be continued far beyond the time when they heal. It is difficult to lay down any rule regarding the duration of the treatment. The treatment of cases should be individualized, and courses of treatment separated by short

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extensive ano-genital lesions. A post-mortem examination was not obtained, therefore it was not possible to know whether there was any visceralization. With proper and prompt treatment, success can be assured. In the early cases, a few injections of potassium antimony tartrate will cure the disease. In one of our cases with three or four injections of antimony tartrate, the ulcer had completely healed. In long-standing cases recurrence in the healed portion is common. Chronic recurrent cases are refractory to antimony treatment, and complete healing in them is often difficult to effect; so the prognosis should be guarded in such cases.

We have great pleasure in thanking Dr. C. Ramamurthi, B.A., M.B., B.S., B.Sc., Professor of Bacteriology, Medical College, Vizagapatam, for the help rendered to us, and Dr. P. Kesava-swamy, the radiologist of the King George Hospital, Vizagapatam, for the photographs.

REFERENCES

- Campbell, M. F. (1928). *Venereal Dis. Information*, Vol. IX, p. 93.
Castellani, A., and Chalmers, A. J. (1919). *Manual of Tropical Medicine*, Baillière, Tindall and Cox, London.
Castellani, A., and Mendelson, R. W. (1929). *Journ. Trop. Med. and Hyg.*, Vol. XXXII, p. 148.
de Vogel, M. W. T. (1928). *Bull. Soc. Path. Exot.*, Vol. XXI, p. 354.
Kalthofen, A. (1928). *Geneesk. Tijdschr. Nederl.-Indie*, Vol. LXVIII, p. 740.
Maciel, H. (1929). *Sciencia Med.*, Vol. VII, p. 517.
Manson-Bahr, P. H. (1929). *Manson's Tropical Diseases*, Cassell & Co., Ltd., London.
McIntosh, J. A. (1928). *Southern Med. Journ.*, Vol. XXI, p. 434.
Menon, T. B. (1933). *Indian Med. Gaz.*, Vol. LXVIII, p. 15.
Rogers, L. (1929). *Recent Advances in Tropical Medicine*, J. & A. Churchill, London.
Williamson, T. V., Anderson, J. W., Kimbrough, R., and Dodson, A. I. (1933). *Journ. Amer. Med. Assoc.*, Vol. C, p. 1671.
Wilson, L. A. (1930). *Ibid.*, Vol. XCV, p. 1093.

rest intervals over a period of four to six months should be instituted. As in the case of organic arsenicals in the treatment of syphilis, it appears to us that the trivalent antimony compound is therapeutically more effective than the pentavalent compound in this cutaneous venereal disease.

Of all the antimony preparations used in the treatment of this disease, 'Fouadin' seems to be superior to others (Williamson *et al.*, 1933). 'Fouadin', named in honour of King Fouad of Egypt, is a trivalent antimony preparation, made by Bayer-Meister Lucius and is being used very successfully in the treatment of Egyptian bilharziasis. It is an antimony compound of pyrocatechin-sodium-disulphonate, the preparation is used in a seven-per-cent solution, and is put up in 25 c.cm. and 50 c.cm. bottles. The manufacturers have stabilized the solution so that it does not undergo oxidation on exposure.

Twenty-five cases (18 males and 7 females) of infective granuloma have been treated in the venereal department of the General Hospital during the past nine months with this preparation and the results have been very encouraging. Its superiority over other antimony compounds in the treatment of infective granuloma may be seen from the following points:—

1. The drug is in ready-made stabilized solution for direct use from the bottle.
2. It can be injected intramuscularly without causing any pain or infiltration. In two cases it was even given subcutaneously and nothing untoward happened except slight pain at the time of injection. It is well known that only a few antimony preparations can be given by the intramuscular route, and certainly a drug injected intramuscularly has certain advantages over one that has to be introduced into the veins.
3. The injections can be given at frequent intervals and even daily.
4. There are no immediate side-effects, no cough, vomiting, fainting or other forms of nitritoid crises.
5. The late effects are negligible, the only complaint in our series was joint pains which occurred during the later part of the treatment. The occurrence of joint pains did not prevent us from continuing the treatment as they were only temporary and disappeared with lesser dosage.

6. No toxic effects were observed either on the kidneys or liver.

7. The rapidity of healing of the lesions is a very striking feature, hence the duration of treatment is shorter than that by other compounds. This is a great advantage both from the point of view of the patient and the hospital.

The following is the course of treatment adopted in the department for an adult male weighing between 100 and 120 pounds. Females receive three-fourths of the male dose. The

injections are given intramuscularly, preferably in the gluteal region. This course is a slight modification of that recommended by Professor Khalil, Parasitologist of the University of Cairo:

Day		Number of c.c.m. of 'Fouadin'
1st day	..	15
2nd day	..	20
3rd day	..	25
4th day	..	30
5th day	..	35
6th day	..	40
8th day	..	40
10th day	..	45
12th day	..	45
14th day	..	50
16th day	..	50
Total		395

In some of the cases, we have administered as much as 60 to 70 c.c.m. of the solution spread out over a month without any ill-result.

Report of a few of the cases of infective granuloma treated with 'Fouadin'

Case 1.—Hindu male, aged 22. Duration of the condition four and a half years. Has been attending the department off and on since 1930. In 1931 he had received 42 grammes of urea stibamine in the space of four months and the granuloma healed. Reported again on the 10th May, 1933, and the condition on admission was as follows:—patient emaciated and anemic, suffers from great pain and loss of sleep—six months' duration; extensive infective granuloma of both groins, root of the penis and anterior aspect of the scrotum.

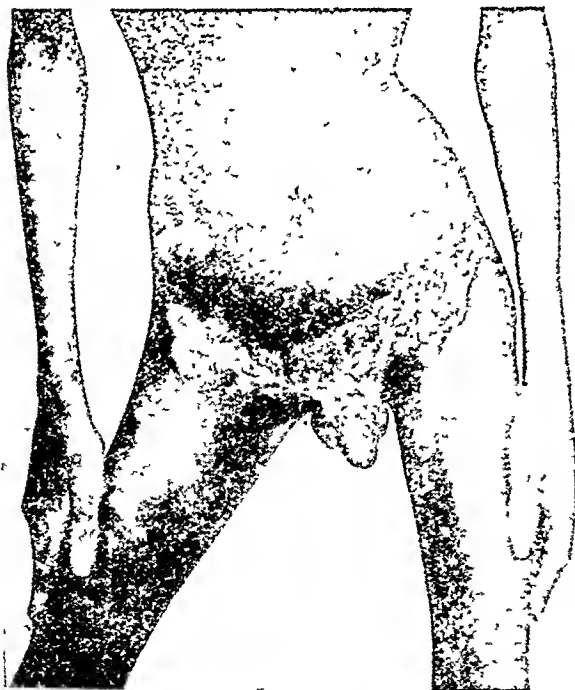


Fig. 1.—Case 1. Before treatment with 'Fouadin'.

the edges of the ulceration are thin and irregular, the base of the ulcer is crateriform in some places; the discharge from the ulcer is thin and offensive. The

patient has developed a deformity of the hips which are kept fixed and adducted; blood Wassermann negative; Frei's test negative.



Fig. 2.—Case 1. After treatment with 'Fouadin'.

He was given injections of urea stibamine twice a week for six weeks. The condition did not show the slightest response; on the other hand, he was becoming toxic, suffering great pain from the ulcers and running a hectic temperature. He had received 125 grammes of urea stibamine and was showing intolerance to the drug. The treatment was stopped and he was given



Fig. 3.—Case 2. Granuloma of the groin before treatment.

x-ray exposures for three weeks with very little benefit. As he did not improve, the patient insisted on being discharged. He reported again on the 17th August. The condition was stationary if not worse. It was decided to try 'Fouadin' as a last resort, and the result of treatment with 'Fouadin' was dramatic. He

was given thirteen injections of 'Fouadin' and the lesions completely healed in 25 days. After the fourth injection the granulomatous mass began to dry up and crust, and the excruciating pain subsided. He put on weight. No untoward reaction, either immediate or late, was observed (*vide* figures 1 and 2).

Case 2.—Hindu male, aged 34. An old case of infective granuloma. Attended the department two years ago and had received injections of urea stibamine.



Fig. 4.—Case 2. The same condition after treatment.

Condition on admission.—Infective granuloma of the left groin, extending downwards to the perineum and posterior part of the scrotum. Scars of healed



Fig. 5.—Case 2. Granuloma of the mouth before treatment.

granuloma on the right groin. Extensive granulomatous ulceration involving the mucous membranes of the lips, gums, cheek and palate on the right side. Salivation and fetor were marked. Patient unable to swallow. Wassermann reaction negative. Frei's test negative.

Patient was given eleven injections of 'Fouadin' in the course of 19 days. After the fifth injection, both the mouth and groin lesions started drying up rapidly

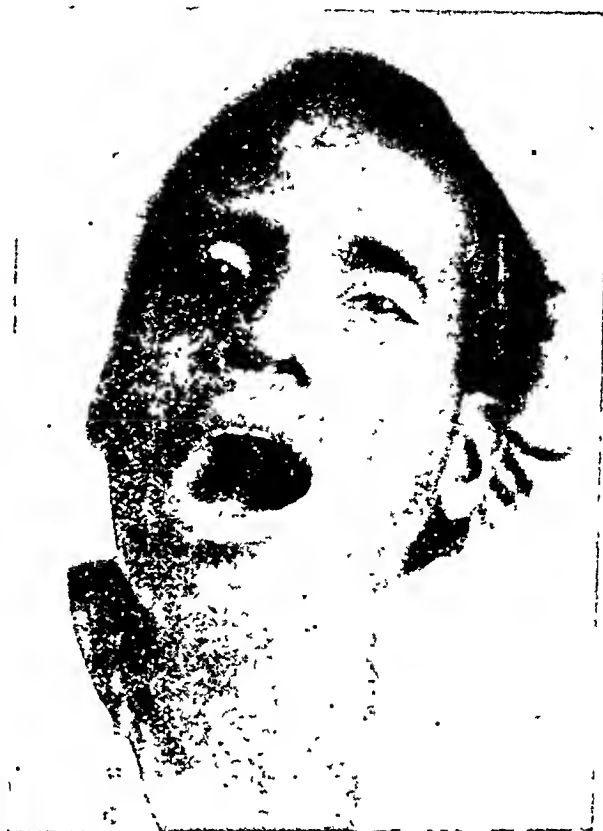


Fig. 6.—Case 2.

and by the end of the tenth injection they had completely healed. No reaction, either immediate or late, was observed (*vide* figures 3 to 6).



Fig. 7.—Case 3. Before treatment.

Case 3.—Hindu male, aged 26. History of sore on penis two years ago for which he underwent a circumcision.

Present condition.—Ulceration of groin of one year's duration. An extensive granulomatous ulceration involving the whole of the right groin and extending downwards and inwards into the perineum and buttock on the same side; patient emaciated and anemic; both



Fig. 8.—Case 3. After treatment.

Wassermann and Frei's tests were negative. A series of seven injections of urea stibamine were given on alternate days for a fortnight. The ulceration did not show any sign of healing and the patient became intolerant to the drug. The treatment was changed to 'Fouadin'.

He had ten injections of 'Fouadin' on alternate days which produced the result seen in the photograph (*vide* figures 7 and 8).

Case 4.—Hindu male, aged 35. An old case of recurrent infective granuloma. Has been attending this department off and on for three years.



Fig. 9.—Case 4. The condition, after treatment.

Present condition.—Infective granuloma involving the inner halves of both groins, the pubic region encircling the root of the penis and extending on to the

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CARBARSONE IN INTESTINAL AMOEBIASIS

PART II

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THE successful treatment of chronic intestinal amoebiasis presents many difficulties to the physician practising in the tropics. The permanent eradication of the firmly established and chronic relapsing infection, with the mucous membrane of the colon more or less extensively involved, is unachievable in a short time by drug therapy alone. What probably happens in such cases

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upper and anterior surface of the scrotum; double hydrocele with elephantiasis of the scrotum; the penis is fixed to the anterior surface of the scrotum.

A course of nine injections of 'Fouadin' in the space of 18 days resulted in complete healing (*vide* figure 9).

Case 5.—Hindu female, aged 23. Prostitute by profession.

Condition on admission.—Extensive nodular ulceration involving both labia and extending to the perineum—one and a half years' duration; both Wassermann and Frei's tests were negative.

A course of ten injections of 'Fouadin' cured the condition in 20 days.

Case 6.—Hindu female, aged 35. Married. Pregnancies, nine, of which five children are alive and well.

Condition on admission.—Infective granuloma of the left labium and fourchette with an elephantoid condition of the former—two years' duration; groin glands not palpable; no skin or mucous membrane lesion; a granulomatous ulceration of the buccal mucous membrane on the right side extending from the angle of the mouth to the last molar tooth; she was unable to open the mouth; the blood Wassermann was strongly positive and Frei's test was negative. Anti-syphilitic treatment was given without any therapeutic result.

A course of ten injections of 'Fouadin' cured the ulceration both of the vulva and mouth. This is a case of active infective granuloma probably in a latent syphilitic.

Conclusions

1. We have treated 25 cases of infective granuloma with 'Fouadin', in the past nine months, with very satisfactory immediate results.

2. It seems to be superior to the other antimony compounds used in the treatment of this troublesome malady.

3. The therapeutic action of the preparation is rapid.

4. No dangerous reaction nor toxic intolerance was observed in any of our cases.

5. This is a preparation eminently suited for the follow-up treatment to prevent recurrence.

My thanks are due to the director and staff of the x-ray institute for the photographs.

REFERENCE

Williamson, T. V., Anderson, J. W., Kimbrough, R., and Dodson, A. I. (1933). *Journ. Amer. Med. Assoc.*, Vol C, p. 1671.

is that the parasitic infestation is reduced to a low level, in which condition both the parasites and the invaded tissue cells live in a state of equilibrium and the symptoms are abated. Ultimately, if there is no further fresh local injury or damage, or if the general resistance of such a patient who is a carrier be not unduly lowered from other causes, complete dissolution of the infection may be effected in time by the patient's natural or possibly acquired powers of resistance against the disease. Of the various methods of treatment recommended for this condition none has given uniformly satisfactory results. In the case of an effective remedy like emetine, the toxic effects produced often overbalance its beneficial effects in chronic relapsing cases (1934). We have, therefore, endeavoured to find drugs which could be effectively given by the mouth without producing serious untoward effects.

The alkaloids of *H. antidyenterica* have given satisfactory results in our hands, but it has been difficult to get a supply of the raw material of uniformly good quantity for their manufacture (Acton and Chopra, 1933). Carbarsone has given such good results in a small series of cases that we have thought it important to carry out more extensive trials with it. This drug is a synthetic compound that is not difficult to prepare, and samples of the drug of a uniform quality are forthcoming. The drug is at present expensive, costing about Rs. 5 per treatment, but with increased demand for it, the manufacturers will probably be able to bring down the cost of production considerably and in this way reduce its price.

We have adopted a uniform method of treatment and a criterion of cure practicable for this country. The ordinary effective dose of carbarsone is 0.25 gramme, administered in gelatine capsules twice daily by the mouth for 10 consecutive days. No other auxiliary treatment is needed, except a daily dose of a mild saline purgative to relieve constipation. Our experience is that the drug acts more effectively if the bowels are kept slightly loose. Where there was an associated bacillary infection, immunization was produced by injection of the autogenous vaccines prepared from the stools. Patients failing with the usual 10-day course were given the drug for 5 days more, i.e., a 15-day course. The additional treatment for 5 days frequently renders the relapsed cases parasite-free without producing any untoward effects. As organic compounds of arsenic are liable to produce toxic effects, we have purposely refrained from giving more prolonged treatment with this drug. In cases who have resisted a 15-day course, we give standardized extract of kurchi, one drachm twice daily for two or three months, and then repeat the course of carbarsone if necessary after this period. In a number of patients kurchi extract given in this way eradicated the infection.

As regards the criterion of cure, there is considerable difference of opinion as to the time after which a relapse might occur after treatment. Some authorities believe that this may occur from the day the treatment is completed up to 2 years afterwards. In the tropics, however, it is hardly possible to differentiate a true relapse from a reinfection as the opportunities for reinfection are abundantly present. Dobell *et al.* (1918) pointed out that the vast majority of relapses occur before the end of the third week after treatment. He, therefore, considered that six negative examinations of the stools, one in the first week, one in the second and the remaining four in the third week, after treatment very carefully made by a competent protozoologist, are adequate enough to be regarded as an index of permanent eradication of the infection. It is fully realized that the proper assessment of the therapeutic activity of a drug in the treatment of this condition is only possible, where the patients can be followed up for some months after the cessation of treatment, with repeated and careful examinations of the stools all the time. However, such a procedure is quite out of the question when one is dealing with patients from a civil population and we have only been able to keep our patients under observation for about a fortnight after treatment. In this way only six to ten examinations of stools, prior to their discharge from the hospital, could be made. Those included in this series as 'cured' are only presumed to be so, on the following grounds:—

1. That the minimum of at least 6 examinations of the stools after treatment proved negative.
2. That the patients were completely relieved of all clinical signs and symptoms prior to their discharge from the hospital.
3. That we were unable to trace any case of relapse, although every patient was instructed, before discharge from the hospital, to report immediately the reappearance of any symptom of the disease.

In the table we have given the results of our observations on a series of 22 cases in which careful daily examinations of the stools were made while the drug was being administered, in order to observe its effect on the infection from day to day, and also to compare its effect with some other remedies. A perusal of the table will show that relapses after treatment occurred as follows with different drugs under trial:—

- I. *Gavano* (a derivative of ipecacuanha).
 - Case 1, the parasites reappeared on the third day after treatment.
 - Case 2, the parasites persisted throughout the course of treatment.
- II. *Arsemetine*.
 - (1) Case 15, the parasites reappeared on the fourth day after treatment.
 - (2) Cases 16 and 20, the parasites persisted throughout the course.

TABLE

No.	Race, sex, age and complaints	Laboratory findings before treatment	Treatment and results	REMARKS
1	A. I., M., 9 Dysentery—3 weeks.	Cell. ex. + Veg. <i>E. h.</i> +	I. Gavano $\frac{1}{2}$ tab., b.d., for 9 days. 3rd day after treatment— Veg. <i>E. h.</i> +. II. Emetine gr. $\frac{1}{2}$ daily for 6 days. 2nd day after treatment— Cell. ex. +; veg. <i>E. h.</i> +. III. Carbarsone—10 days. 15 examinations from 4th day of treatment—negative.	I. Gavano (failed). II. Emetine (failed). III. Carbarsone (cured).
2	A. I., F., 46 Dysentery—1 week.	Cell. ex. + Veg. <i>E. h.</i> + C.-L. crystals +	I. Gavano 1 tab., b.d., for 8 days. Throughout treatment— Cell. ex. +; veg. <i>E. h.</i> +. II. Carbarsone—10 days. Fourteen examinations from 3rd day of treatment—negative.	I. Gavano (failed). II. Carbarsone (cured).
3	H., F., 46 Irregular fever—1 month. Dysentery—while in the hospital.	Cell. ex. + Veg. <i>E. h.</i> +	Carbarsone—10 days. 13 examinations from 5th day of treatment—negative.	Carbarsone (cured).
4	H., M., 14 Fever with pain in joints—3 months. Dysentery—while in the hospital.	Cell. ex. + Veg. <i>E. h.</i> +	Carbarsone—10 days. 6 examinations from 5th day of treatment—negative	Carbarsone (indeterminate). Patient died of pneumonia.
5	E., M., 55 Dysentery—on and off, 1 year, present attack 4 days.	Cell. ex. + Veg. <i>E. h.</i> + C.-L. crystals + and <i>S. morgani</i> .	Autovaccine—6 doses. Carbarsone—10 days. 12 examinations from 5th day of treatment—negative.	Carbarsone (cured).
6	E., M., 31 Chronic dysentery—1 year.	<i>E. h.</i> cysts +	Autovaccine—6 doses. Carbarsone—10 days. 6th day after treatment—scanty veg. <i>E. h.</i>	Carbarsone (failed). Patient left the hospital after 10 days' treatment.
7	A. I., F., 28 Low fever—3 months Dysentery—nil.	<i>E. h.</i> cysts +	Carbarsone—10 days. 14 examinations from 3rd day of treatment—negative.	Carbarsone (cured).
8	E., F., 38 Low irregular fever—3 years. Dysentery—nil.	<i>E. h.</i> cysts + and <i>S. morgani</i> .	Autovaccine—6 doses. I. Carbarsone—10 days. 3rd day after treatment—scanty <i>E. h.</i> cysts. II. Carbarsone—5 days. 11 examinations from 2nd day of (II)—negative.	Carbarsone—15 days (cured).
9	A. I., F., 27 Allergic dermatitis (foot) 1 year. Dysentery—nil.	<i>E. h.</i> (veg. and cyst) +	Carbarsone—10 days. 14 examinations from 3rd day of treatment—negative.	Carbarsone (cured).
10	H., M., 40 Pain abdomen increasing after meals—3 months. Dysentery—7 years ago.	<i>E. h.</i> cysts +	Carbarsone—10 days. 12 examinations from 3rd day of treatment—negative.	Carbarsone (cured).
11	E., M., 53 Chronic dysentery—3 months.	Scanty veg. <i>E. h.</i> and <i>B. pseudocarinatus</i> .	Autovaccine—6 doses. Carbarsone—10 days. 11 examinations from 7th day of treatment—negative.	Carbarsone (cured).

TABLE—*contd.*

No.	Race, sex, age and complaints	Laboratory findings before treatment	Treatment and results	REMARKS
12	A. I., F., 15 .. Alternate constipation and diarrhoea—6 months. Dysentery—10 months ago.	<i>E. h.</i> cysts + and <i>B. pseudo-carolinus</i> .	Autovaccine—6 doses. Carbarsone—10 days. 13 examinations from 4th day of treatment—negative.	Carbarsone (cured).
13	E., M., 35 .. Irritation of anus and loss of energy—3 months. Dysentery—1 year ago.	Scanty veg. <i>E. h.</i>	Carbarsone—10 days. 13 examinations from 4th day of treatment—negative.	(Cured).
14	H., F., 35 .. Low fever with diarrhoea—7 months. Dysentery—1 year ago.	<i>E. h.</i> cysts +	Carbarsone—10 days. 14 examinations from 3rd day of treatment—negative.	(Cured).
15	H., M., 45 .. Pain abdomen and irregular bowels—1 month. Dysentery— <i>nil</i> .	Cell. ex. <i>nil</i> Veg. <i>E. h.</i> +	I. Arsemetine (subcutaneously)—10 days. 4th day after treatment—scanty <i>E. h.</i> cysts. II. Carbarsone—10 days. 7 examinations from 4th day of treatment—negative.	I. Arsemetine (failed). II. Carbarsone—10 days (indeterminate). Patient left the hospital after 10 days' treatment.
16	E., M., 25 .. Passage of mucus with stools—1 month. Dysentery—2 years ago.	<i>E. h.</i> cysts + and <i>B. asiaticus</i> .	I. B. K. I. gr. x, b.d., for 10 days. Throughout treatment—scanty <i>E. h.</i> cysts +. II. Arsemetine (subcutaneously)—10 days. Throughout treatment— <i>E. h.</i> cysts +. III. Carbarsone—10 days. 14 examinations from 3rd day of treatment—negative.	I. B. K. I. (failed). II. Arsemetine (failed). III. Carbarsone (cured).
17	H., M., 35 .. Allergic dermatitis—3 months. Dysentery—1 year ago.	Scanty <i>E. h.</i> cysts.	Carbarsone—10 days. 14 examinations from the 8th day of treatment—negative.	Carbarsone (indeterminate). Patient left the hospital after 10 days' treatment.
18	E., M., 24 .. Diarrhoea—6 days. Dysentery— <i>nil</i> .	<i>E. h.</i> (veg. and cyst) + Cell. ex. <i>nil</i> .	Carbarsone—10 days. 14 examinations from the 3rd day of treatment—negative.	Carbarsone (cured).
19	E., F., 16 .. Urticaria—1 month. Dysentery— <i>nil</i> .	Scanty <i>E. h.</i> (veg. and cyst) and <i>B. pseudo-carolinus</i> .	Autovaccine—6 doses. I. B. K. I. gr. x, b.d., for 10 days. Throughout treatment—veg. and cysts of <i>E. h.</i> +. II. Carbarsone—10 days. 12 examinations from the 5th day of treatment—negative.	I. B. K. I. (failed). II. Carbarsone (cured).
20	E., F., 33 .. Low fever—5 months. Dysentery— <i>nil</i> .	Scanty <i>E. h.</i> cysts and <i>B. pseudo-carolinus</i> .	Autovaccine—6 doses. I. Arsemetine (subcutaneously)—10 days. Throughout treatment— <i>E. h.</i> cysts +. II. Carbarsone—10 days. Throughout treatment— <i>E. h.</i> cysts +.	I. Arsemetine (failed). II. Carbarsone (failed). Patient left the hospital after 10 days' treatment.

TABLE—concl'd.

No.	Race, sex, age and complaints	Laboratory findings before treatment	Treatment and results	REMARKS
21	H., F., 49 .. Pityriasis rubra—5 years. Mild attacks of dysentery—off and on; bowels—constipated.	Scanty <i>E. h.</i> (veg. and cysts) and <i>B. pseudo-carolinus</i> .	Autovaccine—6 doses. Carbarsone—10 days. 14 examinations from 3rd day of treatment—negative.	Carbarsone (cured)
22	E., M., 38 .. Chirorpompholyx—hands. Dysentery—nil.	<i>E. h.</i> cysts + and <i>B. pseudo-carolinus</i> .	Autovaccine—6 doses. Carbarsone—10 days. 14 examinations from 3rd day of treatment—negative.	Carbarsone (cured).

Abbreviations used:—

A. I., M.	..	Anglo-Indian male.	Cell. ex.	..	Cellular exudates.
A. I., F.	..	Anglo-Indian female.	Veg.	..	Vegetative.
H., M.	..	Hindu male.	<i>E. h.</i>	..	<i>E. histolytica</i> .
H., F.	..	Hindu female.	C-L. crystals	..	Chareot-Leyden crystals.
E., M.	..	European male.	Tab.	..	Tablets.
E., F.	..	European female.	B. K. I.	..	Bismuth kurchi iodide.

III. *Kurchi bismuth iodide*.

Cases 16 and 19, the parasites persisted throughout the course of treatment.

IV. *Emetine*.

(1) Case 1, the parasites reappeared on the second day after treatment.

V. *Carbarsone*.

(1) Case 6, the parasites reappeared on the sixth day after treatment.

(2) Case 8, the parasites reappeared on the third day after treatment.

(3) Case 20, the parasites persisted throughout the course.

On analysing the data obtained, it will be seen that in 6 cases the parasites persisted throughout the course of treatment and in the remaining 5 they reappeared from the second to the sixth day after treatment. It would appear from this that the chances of detecting a relapse with six examinations after cessation of treatment are considerable and that the criterion of cure employed by us gives a fair estimate of the efficacy of a drug. A further study of the table will show that the reduction in the number of parasites in the stools occurred on an average within 4 to 5 days after the treatment was started and the stools became entirely parasite-free in most cases in this period.

Of the 22 patients treated with carbarsone in this series, five had blood and mucus in their stools prior to treatment, *i.e.*, had acute dysentery; the remaining 17 were cases of chronic amebiasis with clinical manifestations. The results may be summarized as follows:—

Total cases treated—22.

Probable cures—17 (77.3 per cent) (nos. 1, 2, 3, 5, 7, 8, 9, 10, 11, 12, 13, 14, 16, 18, 19, 21 and 22).

Failures—2 (9.1 per cent) (nos. 6 and 20).

Indeterminate—3 (13.63 per cent) (nos. 4, 15 and 17).

Ratio of probable cures to failures—1:0.12.

Number of acute dysentery cases treated—5.

Probable cures—4 (80 per cent) (nos. 1, 2, 3 and 5).

Failures—nil.

Indeterminate—1 (20 per cent) (no. 4).

Number of chronic cases treated—17.

Probable cures—13 (76.5 per cent) nos. 7 to 14, 16, 18, 19, 21 and 22).

Failures—2 (11.7 per cent) (nos. 6 and 20).

Indeterminate—2 (11.7 per cent) (nos. 15 and 17).

Amongst the cured chronic cases, one case relapsed after the usual 10-day course of carbarsone, but responded to a further 5-day course.

Indeterminate cases.—In the 3 indeterminate cases (no. 4—acute, and nos. 15 and 17—chronic) referred to above, though the stools in all the cases became parasite-free during the course of treatment and remained so throughout the course, they could not be followed up. One (no. 8) died of intercurrent disease the day after the end of the treatment, two cases (nos. 15 and 17) left the hospital as soon as their treatment was finished; the last two were however relieved of their symptoms prior to discharge.

Failures.—Two cases (nos. 6 and 20) failed with the usual 10-day course of carbarsone, and the patients could not be put on an additional 5-day treatment as they left the hospital. In one case (no. 6) the parasites disappeared from the third day of treatment but reappeared 6 days after the course. The second case (no. 20) was the most resistant one in the whole series, as parasites persisted in the stools throughout the whole course, a finding which was not observed in any other case in this series.

Disappearance of the parasites from the stools during treatment with carbarsone occurred as follows :—

3rd day of treatment	12 cases.
4th " "	4 "
5th " "	3 "
7th " "	1 "
8th " "	1 "

A perusal of these results shows that it takes on an average three to four days to make the stools parasite-free with carbarsone. In one case (no. 8) the stool became parasite-free on the third day of treatment, but he was positive again three days after the course; he was then put on a further 5 days of treatment, became parasite-free from the second day (12th day of carbarsone) and remained so during the follow-up period. In the failure case (no. 20) the parasites were persistent throughout the whole course of treatment.

Cases associated with bacillary infection.—Ten cases (45.4 per cent) in this series suffered from infection with non-lactose-fermenting organisms :—

(1) <i>Bact. pseudo-carolinus</i>	in 7 (70 per cent).
(2) <i>Bact. morgani</i>	2 (20 ").
(3) <i>Bact. asiaticus</i>	1 (10 ").

In these patients immunization by injections of autogenous vaccines was carried out along with carbarsone treatment with good results.

Cases 1, 2, 15, 16, 19 and 20 (see table) are interesting because they afford an opportunity of comparing the relative efficacy of this drug with some of the others under trial.

Summary and conclusions

(1) Carbarsone is an organic arsenical preparation put on the market by Messrs. Lilly and Co., of Indianapolis, U. S. A., for the treatment of intestinal amœbiasis. It is ordinarily administered in capsules of 0.25 gramme twice daily for 10 consecutive days by mouth, but in persistent cases the treatment may be prolonged to 15 days. In our present series of 22 cases, the probable cure rate was 77.3 per cent, certain failures 9.1 per cent and indeterminate 13.6 per cent. Thus, the proportion of probable cures to failures was 1:0.12.

(2) The drug appears to be equally efficacious both in the acute and chronic phases of the disease, the cure rate in the acute form being about the same as in the chronic cases.

(3) Daily examinations of the stools in this series showed that it took 3 to 4 days, on an average, to make the stools parasite-free. The results obtained compare favourably with those obtained with other antidyenteric remedies.

(4) Our general impression, from the small series of 53 cases published in this and the previous paper, is that carbarsone is likely to prove

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THE VALUE OF SANOCRY SIN TREATMENT IN PULMONARY TUBERCULOSIS

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SANOCRY SIN has been in use as a remedy against tuberculosis for over eight years. There are advocates both for and against the drug. Those who saw in it a specific against tuberculosis have been disappointed and those who were sceptical as to its usefulness have also proved to be wrong. A recent review (Henrichsen and Sweany, 1933) of a vast amount of

(Continued from previous column)

a very valuable drug in the treatment of intestinal amœbiasis. It certainly fulfils many of the requirements of an ideal remedial agent, as :—

- It can be administered by the mouth.
- It promptly relieves clinical symptoms.
- It is suitable for general outpatient or dispensary use.
- No toxic or other untoward effects have so far been observed in doses mentioned in this paper.
- The treatment with the drug does not need the patient to be in bed and it often does not interfere with the ordinary work.
- Lastly, the drug being an arsenical exercises a remarkable tonic effect on the system in general.

We are very grateful to Messrs. Lilly and Co. for their generosity in supplying us with large quantities of this drug free of cost for trials in our hospital.

REFERENCES

- Acton, H. W., and Chopra, R. N. (1929). Kurchi bismuthus iodide—its value in the treatment of chronic amœbic infections of the bowel. *Indian Med. Gaz.*, Vol. LXIV, p. 481.
- Idem* (1933). The treatment of chronic intestinal amœbiasis with the alkaloids of *Holarrhena antidysenterica* (kurchi). *Ibid.*, Vol. LXVIII, p. 6.
- Chopra, R. N. (1934). Toxic effects of emetine. *Ibid.*, Vol. LXIX, p. 309.
- Chopra, R. N., Sen, B., and Sen, S. (1933). Treatment of chronic intestinal amœbiasis with carbarsone. *Ibid.*, Vol. LXVIII, p. 315.
- Chopra, R. N., Sen, S., and Sen, B. (1934). Treatment of chronic intestinal amœbiasis with gavano, a derivative of ipecacuanha. *Ibid.*, Vol. LXIX, p. 130.
- Dobell, C., Gettings, H. S., Jepps, M. W., and Stephens, J. B. (1918). A study of 1,300 convalescent cases of dysentery from home hospitals. *Medical Research Committee, Special Report Series*, No. 15 (London).
- Knowles, R., Das Gupta, B. M., Dutta Gupta, A. K., and Gupta, U. (1928). The treatment of intestinal amœbiasis. (An analysis of results and a review of the literature). *Indian Med. Gaz.*, Vol. LXII, p. 455.
- Leake, C. D. (1932). Chemotherapy of amœbiasis. *Journ. Amer. Med. Assoc.*, Vol. XCVIII, p. 195.
- Reed, A. C., Anderson, H. H., David, N. A., and Leake, C. D. (1932). Carbarsone in the treatment of amœbiasis. *Ibid.*, Vol. XCVIII, p. 189.

literature on this subject shows that those who condemn sanocrysin are in the minority and are those who have treated only a very few cases. Those, however, who have used the drug in a large number of cases, although some of them have had to revise their original ideas, are yet still continuing to use it, as they have all found in it a definite advance over other drugs which had been advocated earlier.

The action of sanocrysin

A review of the original experiments and opinions regarding the action of sanocrysin was given in an article by Primodt-Möller (1927).

Möllgaard's original supposition that the effect of sanocrysin is due to the direct destruction of tubercle bacilli in tissue cannot be maintained (Schroder, 1933, and Secher, 1931). The theories which soon gained ground are those which attribute the effect of sanocrysin not to direct destruction of the bacilli in the organism but to action on the tuberculous tissue for which it has a special affinity. This action brings into circulation protein-containing products of the tissue broken down which stimulates phagocytosis and formation of connective tissue. Recently, many workers have shown that sanocrysin has a special influence on the reticulo-endothelial system in the cells of which the gold is stored up and only gradually released, thereby causing a long-continued action of the gold salt, through an activation of this system so important in resisting infection.

Doses

When first introduced, sanocrysin was used in large doses, which according to our present usage would be called *massive*. The initial dose as used in western countries in the earlier years ranged from 0.25 to 0.5 gramme, followed by doses of 1 gramme with an interval of 3 to 5 days, up to a total amount of usually 9 to 10 grammes. This was often followed by very severe reactions sometimes resulting in death. Secher (1931) still advocates the use of large doses, but the majority of those who use sanocrysin have found smaller doses not only less dangerous but also actually much more beneficial (Stub-Christensen, 1931).

When sanocrysin treatment was first started in the Union Mission Tuberculosis Sanatorium, Madanapalle (in 1925), we gave smaller doses than those used at that time in western countries. Our initial dose was usually 0.1 gramme followed by 0.25, 0.37, 0.5, 0.62, 0.75 and 1.0 gramme giving a total of 3 to 4 grammes. More recent experience has shown that we can get equally good results with even smaller doses, and we now give an initial dose of 0.01 gramme; when there are no reactions, this is followed by doses of 0.02, 0.04, 0.08, 0.16, 0.24, 0.32, 0.4 and 0.5 with weekly intervals, hence our average total amount for one course is now only 1.5 to 2 grammes. A second course after an interval of 6 to 10 weeks is sometimes given.

With the lessening of the dose the usefulness of sanocrysin has also considerably widened as it may now be used in cases with high fever; this was not possible before.

Types of cases suitable for sanocrysin treatment

The results of sanocrysin treatment vary with the type of cases treated. It is generally agreed that the most suitable cases are of the exudative type provided they are not too acute or too extensive (Smith, 1932). This was the type of disease in animals in which Möllgaard carried out his original experiments and obtained such good results. Gravesen (1930) has pointed out that, in comparing the results obtained in man with those obtained by Möllgaard in his animal experiments, the cases selected should as far as possible be of the same type of disease as in the original experiments. This means that we could expect the best results to be obtained in cases with recent actively-developing disease with exudative infiltration or with disseminated nodular deposits or with a combination of both, but without definite cavity formation or marked fibrotic changes. Such cases have in actual practice been found to benefit best by sanocrysin treatment, but unfortunately it is rare to find such ideal cases among patients coming for treatment to a tuberculosis institution in India. The majority of patients, by the time they seek expert medical advice, have reached the stage of cavity formation or have extensive fibrotic changes, and one cannot expect the same good results in them as in the cases best suited for sanocrysin treatment. Yet one can expect some improvement in advanced tuberculosis with mixed fibro-cavernous exudative types of disease, but the extent of the improvement depends on how much the disease is of the fresh exudative type and how much of the later cavernous or fibrotic type. Where there is mainly a cavernous or a fibrotic type with very little fresh exudation, sanocrysin has little effect, but where, although there may be definite cavity formation, there is yet a fresh spreading exudative process, sanocrysin is of use in checking the activity and clearing up the exudative part of the disease, while leaving the cavities unaffected. These must be dealt with by collapse therapy, as for example pneumothorax.

Experience gained in treatment with sanocrysin has also shown us that a combination of collapse therapy with sanocrysin is a definite advance in the treatment of mixed types of pulmonary tuberculosis where cavitation or fibrosis and exudative processes coexist. Sanocrysin may be given either before, or after, or at the same time as collapse therapy, this entirely depending on the nature of the disease in the individual case. A fresh exudative process may predominate and treatment with sanocrysin appear as the treatment of choice, but cavities which were masked by the exudative processes may become obvious during the course of treatment, requiring the induction of collapse

therapy. On the other hand when cavitation is definite, collapse therapy is indicated as the primary procedure, with sanocrysin as an adjunct to clear up any exudative disease in uncollapsed portions of a partially collapsed lung, and to clear up any fresh disease which may appear during treatment in the contralateral lung.

When there is cavitation in one lung and exudative, but not extensive, disease in the other, collapse therapy and sanocrysin treatment may be begun simultaneously.

Further, there are frequently cases in which the disease is so extensive in both the lungs as to preclude collapse therapy. In some of these cases a course of sanocrysin may clear up the disease in the one lung to such an extent as to make it possible to begin collapse therapy in the other side.

Contra-indications

Sanocrysin is contra-indicated in cases where there is albuminuria showing kidney affection, dermatitis, stomatitis, intestinal tuberculosis, and extreme cachexia. High fever used to be considered as a contra-indication when large doses of sanocrysin were used, but, since the introduction of smaller doses, it is not so considered. In selecting cases for treatment with sanocrysin these contra-indications must always be considered.

Complications

During the treatment the patients have to be observed carefully, both by laboratory examinations, chiefly of urine for albumin, two or three times a day, and clinically for complications arising out of the treatment, such as dermatitis, stomatitis, pigmentation of the skin and intestinal ulceration—all signs of metal poisoning.

Two of the three severe dermatitis cases and the four cases of pigmentation of skin occurred during the earlier years of the sanocrysin treatment when we were using the larger doses. Even with the smaller doses one occasionally comes across mild dermatitis shown by itching, towards the end of the sanocrysin course or sometimes a few weeks after the sanocrysin treatment has been stopped.

Results of treatment

Since the year 1925, 440 patients have been treated with sanocrysin at the Union Mission Tuberculosis Sanatorium. Of these 350 had four or more injections of sanocrysin and therefore can be considered in statistics. A review of the results of these 350 patients shows that 257 or 73.4 per cent were discharged with positive results, 163 or 46.6 per cent as 'clinically well', under which term are included patients discharged as 'arrested' and 'much improved'. The value of any special treatment in pulmonary tuberculosis is best judged by its results in the advanced cases (III stage).

Of the 350 patients 264 were in stage III of whom 66.7 per cent obtained improvement as the result of treatment, and 36 per cent were discharged as 'clinically well'. If we compare these results with those of a group of 471 consecutive patients in stage III treated during the years 1920 to 1925, that is, before the introduction of sanocrysin, we find that only 39.3 per cent of this group obtained improvement as compared with the 66.7 per cent of those treated with sanocrysin, and 19.5 per cent were discharged as 'clinically well' compared with the 36 per cent of those treated with sanocrysin.

This is shown in table I.

TABLE I
Results of treatment of stage-III patients with and without sanocrysin

	Total	POSITIVE RESULTS		CLINICALLY WELL	
		Number	Percentage	Number	Percentage
Patients treated before introduction of sanocrysin, 1920 to 1925.	471	185	39.3	92	19.5
Patients treated with sanocrysin, 1925 to 1933	264	176	66.7	95	36

Sanocrysin may have to be stopped temporarily or permanently, or the dose may be decreased or the intervals between doses increased, if complications arise.

The complications we have come across during treatment of 440 patients with sanocrysin are as follows :—

Albuminuria	trace	..	..	82
	moderate	..	..	61
	severe	..	..	3
Dermatitis	mild	..	..	4
	severe	..	..	3
Pigmentation of skin (due to gold deposit, chrysiasis).				
Stomatitis	mild	..	..	7
	severe	..	..	4

The value of sanocrysin treatment can also be seen if we consider the results from the point of view of disappearance of tubercle bacilli from the sputum and disappearance of fever. Of the 264 stage-III cases, 151 received sanocrysin without any additional treatment besides the basic routine sanatorium treatment. Of these 143 had bacilli in the sputum at the time of beginning sanocrysin treatment. Bacilli disappeared in 21.7 per cent as compared with 12.3 per cent in a similar group of 423 sputum positive patients treated with routine sanatorium treatment only, during the years 1920 to 1925.

Of the same group of 151 stage-III patients 119 had fever at the time of starting sanocrysin

treatment. Of these 50.4 per cent lost their fever as a result of the treatment compared with 32.2 per cent of 301 patients treated with routine sanatorium treatment only, during the years 1920 to 1925.

These results are shown in table II.

shows that in the group that had sanoerysin 33.8 per cent lost bacilli as compared with 16.7 per cent of those without sanoerysin, and 53.2 per cent became free from fever as compared with 22.5 per cent of the second group.

This is shown in table IV.

TABLE II

Results of treatment of stage-III patients with and without sanoerysin
(The disappearance of tubercle bacilli from the sputum and disappearance of fever.)

	TUBERCLE BACILLI			FEVER		
	Patients positive on admission	PATIENTS NEGATIVE ON DISCHARGE		Patients with fever on admission	PATIENTS WITHOUT FEVER ON DISCHARGE	
		Number	Percentage		Number	Percentage
Patients having routine sanatorium treatment only, before the introduction of sanoerysin, 1920 to 1925.	423	52	12.3	301	98	32.2
Patients having sanoerysin in addition to routine sanatorium treatment, 1925 to 1933.	143	31	21.7	119	60	50.4

Earlier in this paper the value of sanoerysin treatment as an adjuvant to collapse therapy was pointed out. We have analysed our results of treatment of patients who had artificial-pneumothorax treatment combined with sanoerysin because there was a contra-lateral affection. Ordinarily these patients would have had a bad prognosis, but sanoerysin has considerably improved their prospects of getting well. Of the 264 stage-III patients, 86 had artificial-

This demonstrates clearly how the introduction of sanoerysin has improved the results of artificial-pneumothorax treatment in patients having disease in the contra-lateral lung.

Summary

1. Since the year 1925, 440 patients have been treated with sanoerysin. Of these 350 had four or more injections. Two hundred and sixty-four of these were in the advanced stage

TABLE III

Results of treatment of stage-III patients with artificial pneumothorax with and without sanoerysin

	Total	POSITIVE RESULTS		CLINICALLY WELL	
		Number	Percentage	Number	Percentage
Patients with artificial-pneumothorax treatment and contra-lateral affection who did not get sanoerysin.	152	42	27.6	22	14.5
Patients with artificial-pneumothorax treatment with contra-lateral affection who received sanoerysin.	86	62	72	31	36

pneumothorax treatment combined with sanoerysin for the above reason. Of these, 72 per cent obtained improvement with 36 per cent 'clinically well', as compared with only 27.6 per cent with 14.5 per cent 'clinically well' in a similar group of 152 patients treated with artificial pneumothorax and having a contra-lateral affection but who did not get sanoerysin as these patients were treated before the introduction of sanoerysin.

This is shown in table III.

A further comparison of these two groups with regard to disappearance of tubercle bacilli from the sputum and disappearance of fever

(III stage) of the disease.

2. The results of treatment of these patients are compared with the results of treatment of groups of patients (who serve as controls) treated before the introduction of sanoerysin.

Conclusions

1. When sanoerysin treatment is combined with ordinary sanatorium treatment the results obtained are much better than those obtained by sanatorium routine treatment alone. This is best seen in the more advanced cases (III stage).

2. When sanoerysin is combined with collapse therapy, it increases the scope of the latter

TABLE IV

Results of treatment of stage-III patients treated with artificial pneumothorax with and without sanocrysin

(The disappearance of tubercle bacilli from the sputum and disappearance of fever.)

	TUBERCLE BACILLI			FEVER		
	Patients positive on admission	PATIENTS NEGATIVE ON DISCHARGE		Patients with fever on admission	PATIENTS WITHOUT FEVER ON DISCHARGE	
		Number	Percentage		Number	Percentage
Patients with artificial pneumothorax and contra-lateral affection who did not get sanocrysin.	151	25	16.7	147	33	22.5
Patients with artificial pneumothorax and contra-lateral affection who received sanocrysin.	80	27	33.8	62	33	53.2

considerably. This is specially seen in cases with contra-lateral affection, where a very bad prognosis may frequently be changed to a better, and even to a good prognosis. This would not have been possible without sanocrysin.

REFERENCES

- Frimodt-Møller, C. (1927). The Sanocrysin Treatment of Tuberculosis with Special Reference to Indian Patients. *Indian Med. Gaz.*, Vol. LXII, p. 375.
- Gravesen, J. (1930). Value of Sanocrysin in Relation to Different Phases of Pulmonary Tuberculosis. *Tubercle*, Vol. XI, p. 193.
- Henrichsen, K. J., and Sweany, H. C. (1933). Sanocrysin Treatment in Tuberculosis. *Amer. Rev. Tuberculosis* (Supp.), Vol. XXVIII, p. 1.
- Schroder, G. (1933). On Gold Therapy in Tuberculosis. *Tubercle*, Vol. XIV, p. 193.
- Secher, K. (1931). Dosage and Results of Sanocrysin Treatment. *Lancet*, Vol. II, p. 1344.
- Smith, G. S. (1932). Study of Results of Sanocrysin Therapy in Pulmonary Tuberculosis. *Tubercle*, Vol. XIII, p. 152.
- Stub-Christensen, V. (1931). Sanocrysin Treatment. *Tubercle*, Vol. XIII, p. 49.

OLEOTHORAX

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THE importance of rest in the treatment of pulmonary tuberculosis is universally recognized. After all the years of study of the disease and for the search of a 'cure', the principle of rest still remains the foundation of the treatment of tuberculosis, and during the last fifty years several attempts have been made to improve the efficiency of the rest treatment. While fifty years ago rest could only be enjoined in a general way by making the patient lie quietly in bed, to-day we can carry it further and apply it to the diseased organ itself. It was Foralini who, in 1882, applied the principle of rest to the diseased lung by inducing artificial pneumothorax. Since then, rapid strides have been made in this direction by the use of procedures like phrenicectomy, extrapleural thoracoplasty, extrapleural pneumolysis and scalenectomy.

Lately, a new procedure has been added to the list of collapse-therapeutic measures under the name of 'oleothorax'. This procedure was introduced by Bernou in 1921 for chronic and purulent effusions of tuberculous origin. It consists in introducing olive oil or liquid paraffin into the pleural cavity. The antiseptic most commonly used with the oil is gomenol which is an essential oil distilled from the leaves of *Melaleuca viridiflora*. Experience has shown that the vegetable oil is more quickly absorbed by the pleura than the mineral oil; this is why olive oil with gomenol is used in cases of purulent effusions as by such absorption gomenol is liberated and can act as an antiseptic for the infected pleura. Olive oil is also milder and less irritant to the pleura than the mineral oil, liquid paraffin.

Crocket (1931) prefers gelatinothorax to oleothorax, as he believes that gelatine-acriflavine acts more satisfactorily by intermingling freely with the effusion in the pleural cavity. He uses 2 to 5 per cent of gelatine in normal saline and neutral acriflavine is added in the proportion of 1 in 1,000 to 1 in 5,000.

Indications.—The use of oleothorax is indicated in the following conditions:—

(1) Pleural effusions.—These may be divided into two groups—(a) benign and simple and (b) severe and recurrent. The first group needs no interference as the fluid gets absorbed in due course. It is the second group where the effusion is recurrent or when it gets purulent that oleothorax is indicated. By maintaining a 'complete antiseptic bath' over the pleural surfaces, as Fishberg (1932) calls it, the gomenol oil reduces or completely stops the formation of pus, maintains the collapse of the lung, and improves the general condition of the patient.

(2) Pleuro-pulmonary perforations.—These may be classified into three groups—(a) temporary and benign, which are generally symptomless and need no interference, (b) large and gaping, which are usually fatal and cannot be benefited by oleothorax, and (c) valvular, where

the weight of the oil by immobilizing the lung gives the fistula a chance to heal.

(3) Adhesions.—Formerly the treatment for this condition was only surgical, Jacoebaeus's procedure for small ones and thoracoplasty when they were extensive. Bernou was the first to show that with oleothorax we may avoid and prevent their formation. Oleothorax can also postpone the onset of obliterative pleurisy following pneumothorax treatment. The injection of oil separates the pleural surfaces and keeps them so by its mechanical action, and the good results of pulmonary collapse are maintained.

(4) Flexible mediastinum.—When the mediastinum is very flexible and is pushed to the other side even under low pressures in pneumothorax treatment, small quantities of the oil injected over a long period render the pleural surfaces more rigid and impermeable, and the mediastinum is tied more or less by the formation of partial adhesions.

(5) Better compression in pneumothorax treatment.—When the collapse is incomplete and ineffective under pneumothorax treatment, the injection of the oil effects better compression of tuberculous lesions, especially cavities which remain uncollapsed under pneumothorax treatment.

(6) As an alternative to pneumothorax treatment.—Under exceptional conditions when the refills are too frequent and cannot be arranged easily, the pneumothorax may be replaced by oleothorax when the oil refills may be given every two or three months. In the opinion of Morristone Davies (1932) here the mediastinum should be mobile and the pneumothorax treatment must have lasted for at least six months.

Technique of oleothorax.—As mentioned above, the oil used is olive oil or paraffin oil. Olive oil is used for disinfecting purposes while liquid paraffin has the advantage of slow absorption and is therefore of value where blockage of the pleural cavity is desired. Olive oil must be absolutely pure and neutral in reaction; it can be tested by the use of ordinary litmus paper. It must be sterilized for an hour and a half at a temperature of 220°F. and must be warmed again at the time of use to body temperature. Gomenol is added in the strength of 5 to 10 per cent at the time of injection.

A number of methods have been employed for the introduction of the oil into the pleural cavity, but we have found that the use of Dieulafoy's two-way syringe is very convenient. It is portable and reliable and can be used alternately for removing the pus from and introducing the oil into the pleural cavity through the same needle.

In performing the operation the patient is made to sit up in bed or on a table and the arm of the side to be treated is raised up. The site selected for puncture—usually the eighth or ninth interspace a little anterior to the mid-axillary line—is cleaned with rectified spirit and

painted with tincture of iodine. The whole of the needle track is anaesthetized by a 2 per cent novocain solution, two cubic centimetres of which is usually sufficient for the purpose. When the novocain needle has entered the pleural cavity, a little of the pleural fluid is drawn into the same syringe for laboratory examination. Five cubic centimetres of gomenol oil is then drawn into another syringe and injected into the pleural cavity, through the same needle left in the chest wall, as a test dose. If there is no reaction, larger quantities of the fluid are aspirated at subsequent sittings and about one-half to two-third the amount of gomenol oil is injected by Dieulafoy's syringe. After the injection of the oil the site of puncture is thoroughly manipulated and a large bandage is applied over the chest and the patient is advised to lie on the opposite side to allow the needle track to close. Unnecessary coughing should be allayed by the use of suitable linetus.

The object of oleothorax in cases of pleural effusion is not to fill the pleural cavity with the oil, but by repeated aspirations and replacement with sufficient quantities of the oil—we have given as much as 600 cubic centimetres of the oil at a sitting—to sterilize the pleural cavity and arrest the recurrence of the effusion and the toxic state produced by the absorption therefrom. Once this is done the lung may either be allowed to re-expand or the oleothorax may be changed into pneumothorax again. Some physicians do air-replacement before commencing oleothorax in order to adjust the intrapleural pressures.

It is important to remember that the air pressure within the pleural cavity above the oil-level should remain slightly negative; then pressure may be determined and if necessary reduced by the use of a pneumothorax apparatus; otherwise with high pressures, compression symptoms and external and internal fistulae may arise.

When the pleural cavity is completely blocked by the oil, the use of Bernou's oleomanometer may give some indication, but there is really no accurate method of determining the pressure of the oil, and here one has to depend principally upon the symptoms of the patient and the experience of the doctor.

The use of oleothorax in pleuro-pulmonary perforations is very limited. It is contra-indicated in cases of large gaping perforations. Its use is, however, indicated in the 'valvular' type where after testing the tolerance of the pleura, the air in the pleural cavity is replaced by the oil until its level is above the valvular rupture, which thereby becomes sealed and further entrance of air into the pleural cavity is prevented. If fluid has already formed, it is aspirated and replaced by the oil. The oleothorax may in these cases close the perforation, sterilize the pleural cavity and make the patient fit, in due course, to undergo a thoracoplastic operation.

Accidents and complications

(1) Febrile reactions.—It is for febrile reactions that the tolerance of the pleura for the oil must always be tested before the treatment is commenced. The febrile reaction may be transitory when it is not dangerous, or it may be severe and be accompanied by an effusion. One of our cases gave a febrile reaction with irritation of the pleura and formation of more effusion.

(2) Compression symptoms.—These may result from over-pressure of the oil. The mediastinum and diaphragm may be displaced too much and cause breathlessness and feeling of oppression. In such cases, the oil must be removed from the pleural cavity until relief is obtained.

(3) Pleuro-parietal fistulae.—These may also be brought about by the pressure of the oil or by excessive cough or by faulty technique. Two of our cases suffered from this complication.

(4) Pleuro-pulmonary fistulae.—These manifest themselves by the taste of the oil in the mouth or by the coughing out of the oil. One of our cases had this complication before oleothorax was tried. Sometimes late perforations occur, but these do not seem to be due to over-pressure, but rather to the renewed activity of old foci of the disease situated under the pleural surfaces. One of our cases suffered from late perforation. In such cases the treatment of choice is thoracoplasty preceded by phrenic evulsion.

Duration of treatment.—The duration of oleothorax depends upon the 'cause' for which it is done. As soon as the cause disappears, the 'remedy' must go with it. The oil, after all, acts as a foreign body and is liable to find its way out externally through the skin or internally through the lung.

Case results.—We have been doing oleothorax in the King Edward VII Sanatorium at Bhowali since 1930. The treatment has been employed in six cases so far. Of these, five cases were receiving pneumothorax treatment and one was a case of spontaneous pneumothorax. Of the five pneumothorax cases, four had developed purulent effusion and one was a case of hæmorrhagic pleurisy following upon the rupture of an adhesion.

Two of the cases treated with oleothorax developed external fistulae. In one, they healed by repeated aspirations, leaving the intra-pleural pressure negative, and by antiseptic dressings, exposure to sun's rays and tight bandaging. In the other, the treatment was of no avail and the patient left the sanatorium and probably died.

In two cases, pleuro-pulmonary fistulae were formed. In one, the fistula was already present when oleothorax was attempted and the treatment had to be abandoned. In the other, the

fistula developed after the patient had kept well for nearly one year and was perhaps the result of reactivation of old foci of the disease.

One case suffered from febrile reactions with increased formation of the effusion. The reaction occurred at the third 'refill' and not at the first.

Of the six cases, three are probably dead; of the other three, one has lived for over three years and the other two for over one year.

(1) M. A., Muslim male, 25 years. Artificial pneumothorax done in November 1929. Developed pleural effusion which became purulent. Oleothorax was done. Still doing well.

(2) B. B. S., Hindu male, 24 years. Joined the sanatorium in March 1931 with purulent effusion following artificial-pneumothorax treatment. Oleothorax done in May 1931. Left sanatorium in November without any improvement. Returned to Bhowali and stayed outside sanatorium in March 1932 with a big swelling in the chest-wall on oleothorax side. This was aspirated several times without improvement. Patient is almost certainly dead now. Complication: external fistula.

(3) J. K. F., Muslim female, 16 years. Artificial-pneumothorax case. Developed hæmorrhagic effusion. Oleothorax attempt showed pleuro-pulmonary fistula. The treatment had to be stopped. Patient got worse and died.

(4) S. N. G., Hindu male, 38 years. Developed purulent effusion after artificial pneumothorax. Oleothorax done in 1932, did much good. Spat blood after some months and rejoined the sanatorium in 1933. Artificial pneumothorax attempt failed. Developed pleuro-pulmonary fistula, left sanatorium. The interesting point in this case is that, although oleothorax did him good in the beginning and he was taking long walks, his blood sedimentation rate always remained high (over 100 mm.) which suggested a bad prognosis.

(5) M. W., Muslim male, 21 years. Developed spontaneous pneumothorax followed by purulent effusion. Oleothorax did much good, but he developed external fistulae. Repeated aspirations done and pleural pressures left negative. Fistulae treated by heliotherapy and tight bandaging. Patient doing fairly well.

(6) R. A., Muslim female, 16 years. Developed purulent effusion after oleothorax done. Test dose of 10 c.cm. and second dose of 50 c.cm. gave no reaction. Third injection of 100 c.cm. gave violent reaction with formation of more and more effusion. He got worse and left this sanatorium.

Conclusions

Oleothorax is a useful adjunct in the treatment of purulent effusion following pneumothorax treatment. The treatment is in no case a cure-all. It finds its chief use in combating certain serious complications and helps in prolonging the life of patients who, without its aid, might have succumbed earlier to the complications. It is a valuable collapse-therapeutic measure in the treatment of pulmonary tuberculosis and its complications.

REFERENCES

- Crocket, J. (1931). Gelatinothorax in Treatment of Infective Conditions of Pleural Cavity. *Tubercle*, Vol. XIII, p. 97.
 Davies, H. M. (1932). Lung Collapse Therapy. *Lancet*, Vol. II, p. 274.
 Fishberg, M. (1932). *Pulmonary Tuberculosis*. Lea and Febiger, Philadelphia.

ISOSPORA INFECTION IN INDIAN CATS

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DURING the course of work extending over several years, in examining the faeces of kittens in connection with work on experimental amebiasis in these animals, we have been struck with the frequency of coccidiosis due to parasites of the genus *Isospora*, and the senior author mentioned this in his *Introduction to Medical Protozoology* (1928). Infection with various species of helminths is also common. On one occasion it was noticed that after a rectal injection of amebic stool a latent coccidiosis in a kitten flared up and became active, with diarrhoea.

Professor B. L. Bhatia, D.Sc., F.Z.S., F.R.M.S., Principal of the Government Intermediate College, Hoshiarpur, who is writing the Sporozoa volume of the *Fauna of British India*, wrote to us asking us if we could give him any information about the species of *Isospora* concerned, and the dimensions of the oöcysts. We had not previously paid any special attention to the matter, but in order to supply Professor Bhatia with accurate information, we decided to study it.

The stools of 21 animals (13 cats and 8 kittens) were examined. In the direct smears of faecal emulsion coccidial oöcysts were detected in only two kittens, one having a very scanty infection and the other showing numerous oöcysts; this latter was the kitten which developed diarrhoea following the injection of amebic stool. On the other hand, the employment of the concentration method introduced for detecting hookworm ova revealed a much higher percentage of infections, viz, 14 out of 21 animals were found infected and the majority of specimens showed a good number of oöcysts.

Still better results were obtained by using the 'D. C. F.' (direct centrifugal flotation) method of Clayton Lane (1923), originally introduced for the concentration of hookworm ova. Plate VII, photomicrograph 6, shows the results with this method, as applied to coccidial oöcysts*. In the case of this kitten, the direct smear showed on an average only two oöcysts per field. As is well known the oöcyst wall in *Isospora* parasites is intensely resistant and it is almost impossible to penetrate it with any fixative. In the 'D. C. F.' method the oöcysts are in contact with the saturated saline only

during the 30 seconds centrifugalization, and are then immediately transferred to normal saline. We have never seen any shrunken or damaged oöcysts by this method. Oöcysts so treated appear normal in every way, and develop in the usual manner in a wet-chamber Petri dish preparation. Plate VII, photomicrographs 1, 2 and 3, show the maturation of the oöcyst in a wet-chamber preparation, and photomicrograph 4 the final sporozoites; these have a worm-like movement, and at times bend so that tip touches tail and then straighten out again.

In order to obtain oöcysts for measurement, the faeces of an infected cat were treated by the 'D. C. F.' method, and the collected oöcysts were transferred to a tube of normal saline. The mixture was then well shaken and centrifuged. The deposit thus obtained showed a very large number of oöcysts. Coverslip preparations of small drops of the deposit were made, and the oöcysts measured and their shape noted. Measurement was carried out with a 1/6th inch dry objective and a no. 3 ocular micrometer which had previously been standardized against the stage micrometer.

Measurements.—In all 253 oöcysts were measured. The smallest oöcyst encountered measured 20.4 by 15.3 microns, and the largest 47.6 by 40.8 microns. Table I gives the frequency distribution of the lengths and breadths of the oöcysts measured, expressed to the nearest micron. Graphs 1 and 2 show the same observations, but in terms of the ocular micrometer used; of which one small division equalled 1.7 microns. Table II presents an analysis of the results.

Discussion.—There has been a vigorous controversy between Dobell (1919, 1926) and Wenyon (1923, 1926, 1926a) as to the number and nomenclature of the species of *Isospora* parasitic in the carnivora and in man. Into this discussion we are loath to enter, since both these distinguished protozoologists have studied the coccidia much more than we have; yet a discussion of our findings is inevitable, if they are to have any value at all.

In his revision of the coccidial parasites of man, Dobell (1919) gives only one species of *Isospora* as parasitic in man, viz, *Isospora hominis* (Rivolta) Dobell, 1919. Wenyon (1923) considers that there are three species parasitic in cats, viz, *Isospora felis* Wenyon, 1926; *Isospora rivolta* Grassi, 1879; and *Isospora bigemina* Stiles, 1891. The last-named is supposed to be situated in the deeper sub-epithelial tissue of the villi of the small intestine, and the development of the oöcyst may be completed in the vertebrate host, while the two former are larger and are parasitic in the epithelium covering the villi, the development of the oöcysts not taking place till after they have left the body. Supposing, by analogy, that a similar state of affairs exists in man, Wenyon concludes that 'the parasite described from the interior of the villi of man by Virchow is a small *Isospora* like *Isospora bigemina*. It bears the name *Isospora hominis* (Railliet and Lucet, 1891)'. For the larger form discovered in the faeces of man during the Great War, and formerly known as *Isospora hominis*, he proposed the new name of *Isospora belli* Wenyon, 1923. Wenyon also reviews the previous literature in support of his thesis.

To this new nomenclature Dobell (1926) takes exception. He also reviews the literature. He

* Unfortunately neither method is of any value for concentrating entamebic cysts.

for '*Isospora rivolta*', and our type B with those given by the same author for '*Isospora felis*'.

Our observations were originally collected to send to Professor Bhatia, but the fact that the matter of species in *Isospora* infections is one of considerable interest to protozoologists is our reason for publishing this paper.

Our thanks are due to Dr. N. Bhaduri, B.Sc., M.B., of the Hookworm Research Department of the School, for providing material, and to Dr. H. P. Chaudhuri, M.B. (Cal.), D.P.H., D.T.M. & H., F.R.S.S. (London), of the Public Health Laboratory, for help with the statistical side of this paper.

Postscript.—In order to further check the above results we measured a further 100 oöcysts, collected from a single stool of a second infected cat. The results were almost identical with those in the first cat, and were as follows:—

Total series	35.18 μ	\pm 6.992 μ	28—42 μ
by	27.44 μ	\pm 6.018 μ	20—33.5 μ
Type A (only)	26.50 μ	\pm 2.454 μ	24—29 μ
by	20.28 μ	\pm 2.039 μ	18—22 μ
Type B (only)	39.71 μ	\pm 3.493 μ	36—43 μ
by	31.20 μ	\pm 3.302 μ	28—34.5 μ

The graphs corresponded closely to those for the first cat, and again showed a zero point for lengths at 33 microns. In the first cat type A predominated; in the second type B.

Both animals were now chloroformed, the entire length of the gut carefully examined and any parts of the small intestine which seemed to show congestion fixed for section cutting. The sections show infection of the epithelial cells only, and not of the sub-epithelial layer. The intestinal contents at different levels were examined in the fresh state. An unexpected finding in the second cat was the occurrence of a fair number of motile sporozoites in the contents of the jejunum and ileum; both in the fresh preparation and in fixed and stained films. It would seem that an occasional *Isospora* oöcyst may develop to maturity within the lumen of the gut, although the vast majority are passed in the unsegmented state.

REFERENCES

- Boughton, D. C. (1930). The value of measurements in the study of a protozoon parasite, *Isospora lacazei* (Labbe). *Amer. Journ. Hyg.*, Vol. XI, p. 212.
- Dobell, C. (1919). A revision of the Coccidia parasitic in man. *Parasitology*, Vol. XI, p. 147.
- Dobell, C. (1926). On the species of *Isospora* parasitic in man. *Parasitology*, Vol. XVIII, p. 74.
- Knowles, R. (1928). *An Introduction to Medical Protozoology*. Thacker, Spink & Co., Calcutta.
- Lane, C. (1923). The mass diagnosis of ankylostome infection. Part I. *Trans. Roy. Soc. Trop. Med. and Hyg.*, Vol. XVII, p. 274.
- Wenyon, C. M. (1923). Coccidiosis of cats and dogs and the status of the *Isospora* of man. *Ann. Trop. Med. and Parasit.*, Vol. XVII, p. 231.
- Wenyon, C. M. (1926). *Protozoology, a Manual for Medical Men, Veterinarians, and Zoologists*. London.
- Wenyon, C. M. (1926a). Coccidia of the genus *Isospora* in cats, dogs and man. *Parasitology*, Vol. XVIII, p. 253.

SOME OBSERVATIONS ON *BALANTIDIUM COLI* AND *ENTAMÆBA HISTOLYTICA* OF MACAQUES

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BARRET AND YARBROUGH (1921) claim to have successfully cultivated *Balantidium coli* of man in a medium consisting of inactivated human serum and 0.5 per cent salt solution, in the proportion of one part of the serum to sixteen parts of salt solution.

But when faeces from the monkey *Silenus* (*Macacus*) *rhesus*, which are invariably crammed with blastocysts, are inoculated into the above medium and incubated at 37°C.—the optimum temperature for growth of most of the intestinal protozoa of warm-blooded hosts—the fungus develops with very great rapidity, with consequent destruction of any *Balantidium coli* which may be present.

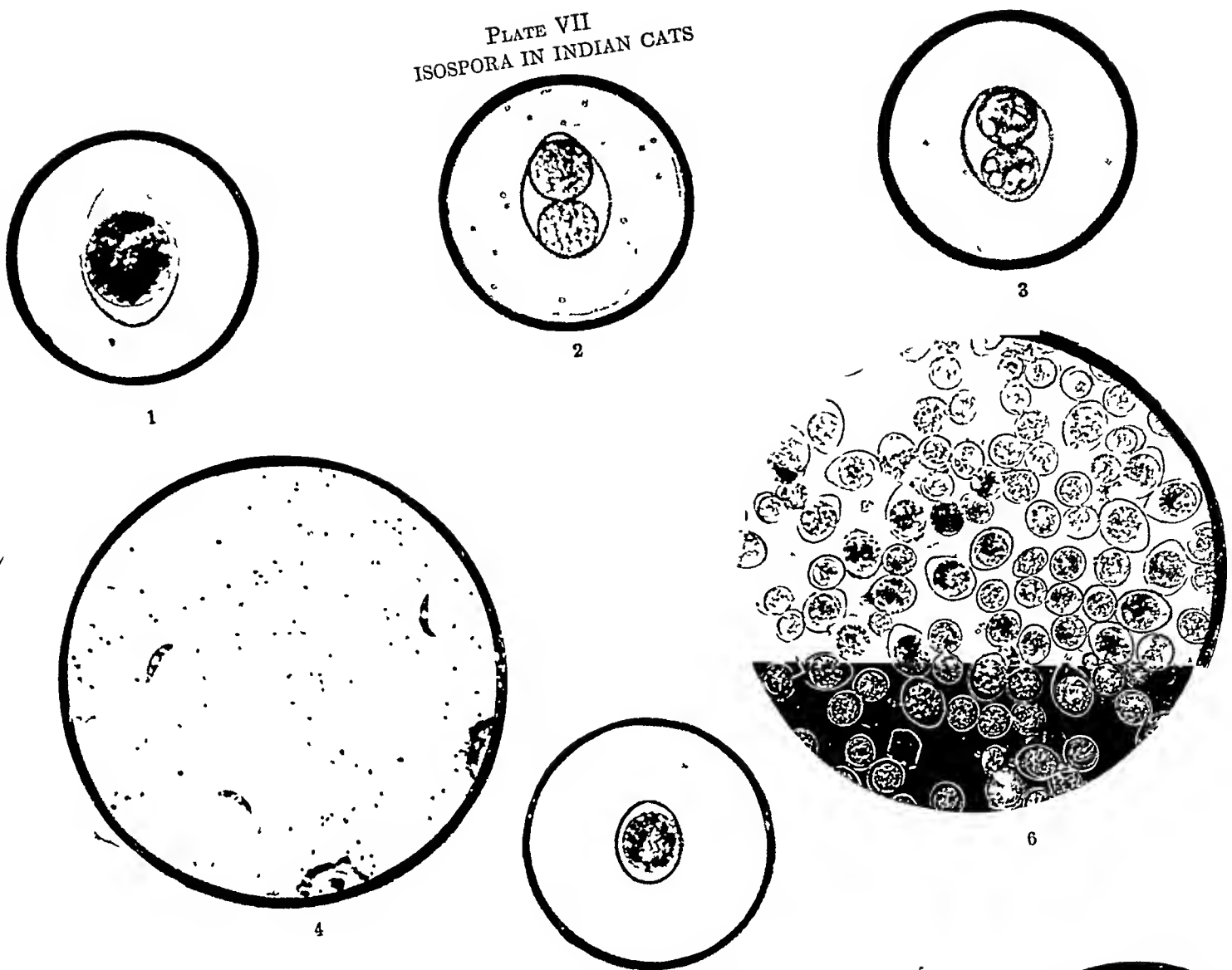
Jameson (1927) has shown that *Balantidium coli* from the domestic pig can be readily cultivated in inspissated horse serum and egg white to which a little solid rice starch has been added—a medium recommended by Dobell and Laidlaw (1926) for the cultivation of the entozoic amœbæ, and especially of *Entamœba histolytica*.

Macaques of species *Silenus rhesus* obtained from dealers in the Calcutta markets are very heavily parasitized with a ciliate protozoon which corresponds morphologically with *Balantidium coli* of man, and some months ago we commenced attempts to cultivate this organism and to transfer it to human volunteers. Our earlier experiments at culture were not too successful, as the cultures were frequently overgrown with blastocysts, in spite of solid rice starch being added to the medium before inoculation.

It was noted that the starch, before it could exert its restraining influence on the development of blastocysts, was split up by the starch-fermenting bacteria which are very often present in monkey's faeces.

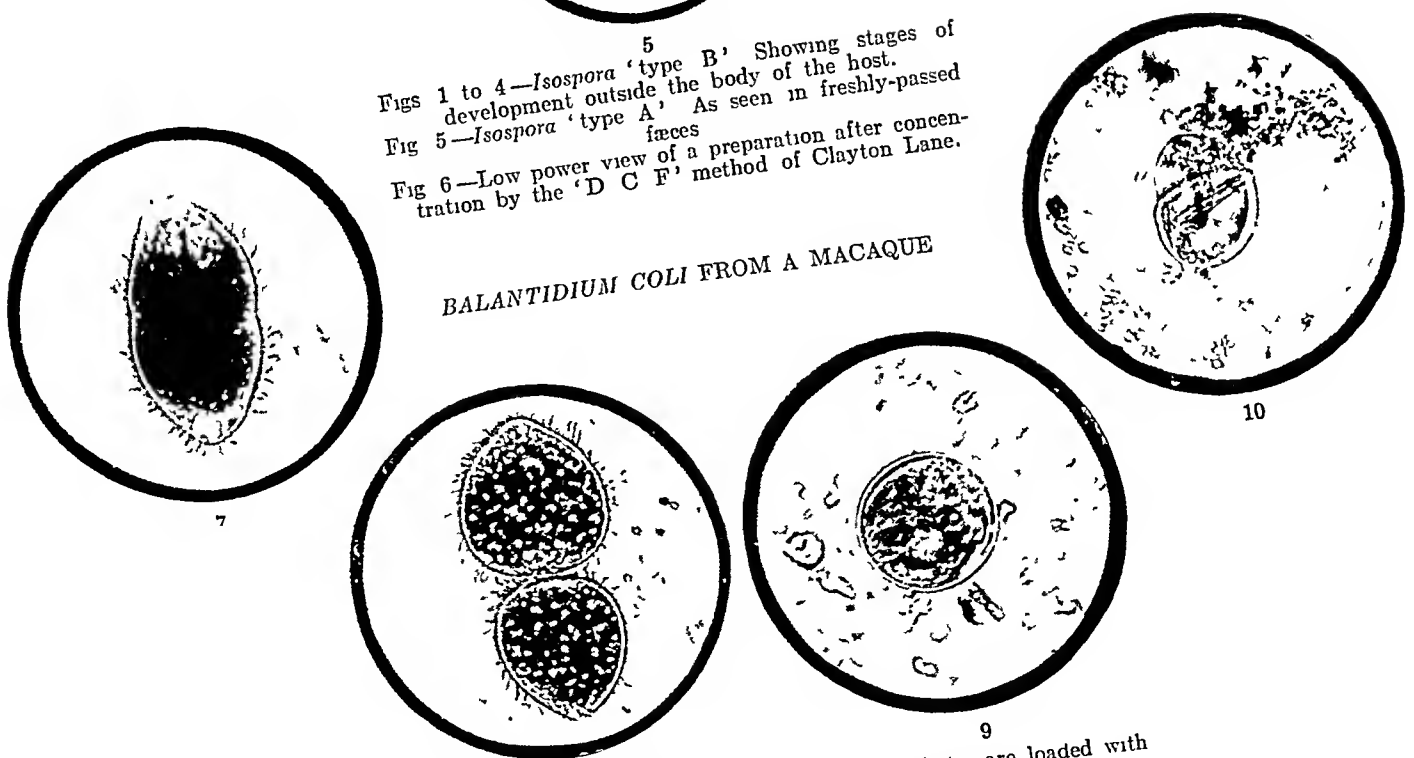
In order to keep down the very troublesome growth of blastocysts, a few drops of acriflavine solution were added to the medium, as suggested by Dobell and Laidlaw (1926). In the majority of instances this gave excellent results, but sometimes even this measure was of no avail, as some of the starch-splitting bacteria were able to withstand a much stronger solution of acriflavine than were the balantidium. We have isolated from monkey's faeces an organism which appears to correspond to 'bacillus 1' of Dobell and Laidlaw (1926), and which these authors claim to be highly detrimental to blastocysts,

PLATE VII
ISOSPORA IN INDIAN CATS



Figs 1 to 4—*Isospora* 'type B' Showing stages of development outside the body of the host.
Fig 5—*Isospora* 'type A' As seen in freshly-passed faeces
Fig 6—Low power view of a preparation after concentration by the 'D C F' method of Clayton Lane.

BALANTIDIUM COLI FROM A MACAQUE



Figs 7 and 8—Undergoing binary fission. The ciliates are loaded with ingested rice starch from the culture medium.
Figs 9 and 10—Showing encystation and excystation respectively.

but even previous inoculation of the culture medium with this bacillus fails to keep down the monkey blastocystis when the resistant starch-splitting bacteria are present in the monkey's faeces.

Reaction of the medium.—The inspissated serum is very alkaline. In twelve samples tested the hydrogen-ion concentration varied from pH 8.8 to 9.2. The fluid part of the medium is about neutral, but when it is left in contact with the serum slope it becomes definitely alkaline, with a pH of about 8.0. This initial alkalinity is not an objection to cultivation of the ciliate. Soon after the tube is inoculated the fluid part of the medium invariably becomes acid, owing to the presence of acid-producing bacteria in the faeces. If the growth of these bacteria is not now checked by the addition of a little acriflavine, a rich culture of *Balantidium* may be ruined very quickly.

At the beginning, subcultures were made daily for a week, by which time the strain of *Balantidium* was well established. After this subcultures were made only every third day. In this way a flourishing culture of *Balantidium coli* of the monkey was maintained for 44 days, and utilized for experimental work.

In culture *in vitro*, multiplication of the ciliate by binary transverse fission in the transverse axis of the body was very frequently observed, the body of the ciliate assuming an hour-glass shape. This process is illustrated in plate VII, photomicrographs 7 and 8. Occasionally encystation occurred, the ciliate within the cyst continuing to revolve slowly within the cyst wall, as illustrated in plate VII, photomicrograph 9. Some of the encysted ciliates showed starch granules in their cytoplasm; these had apparently been ingested by the ciliate in its motile trophozoite phase, but had not been extruded prior to encystation. Encystation did not occur with any regularity, and we were not able to investigate the factors which induced it to occur. Jameson (1927) whilst working with the *Balantidium* of pigs never encountered encystation *in vitro*.

Excystation was observed once only; the process is shown in plate VII, photomicrograph 10—from fresh material fixed with osmic acid vapour whilst excystation was occurring. Although the cysts of *Balantidium coli* possess a very thick cyst wall the cysts do not survive in culture, but degenerate within 24 hours.

Though conjugation was a prominent feature of the cultures of *Balantidium coli* of pigs, as seen by Jameson, it was of rather infrequent occurrence in our cultures of the monkey *Balantidium*. At one time we had one culture tube showing a very large number of cysts, but this encysting strain was unfortunately lost through failure to make a timely transplant.

In order to obtain cysts in large numbers for experimental purposes, the method of inducing encystation of *Entamoeba histolytica* devised by

Dobell (1928) was followed. Monkey's stools containing the ciliate were inoculated into rice-free medium, with the result that blastocystis commenced to overgrow the ciliates. At this moment transplantation into medium containing rice starch greatly improved the growth of *Balantidium*, but no great degree of success was achieved in inducing encystation. Although a very flourishing culture strain of the monkey *Balantidium* was maintained for over six weeks, the ciliate only encysted *in vitro* on five occasions.

Attempts to infect human beings with the Balantidium of monkeys

Dobell (1931) has proved that the entamoeba of macaques, resembling *Entamoeba histolytica* of man, is identical with the latter parasite. In a later paper, Dobell (1933) has shown that the amoeba of genus *Endolimax* of macaques is morphologically and culturally identical with *Endolimax nana* of man; that man can be parasitized with the *Endolimax nana* of macaques, and macaques with the *Endolimax nana* of man; the two are therefore identical.

It thus appears that possibly the other intestinal protozoa of macaques may be transmissible to man. Walker (1913) has shown that monkeys when fed or injected per rectum with *Balantidium coli* of man become infected. It thus seems possible that the *Balantidium* of macaques and man are interchangeable, and we decided to investigate this possibility.

The stools of a human volunteer were carefully examined daily for a period of five weeks. At no time was any *Balantidium* found, and the only protozoon present was *Entamoeba coli*. This volunteer was now fed on cultures of *Balantidium coli* from *Silenus rhesus* showing numerous cysts—the culture medium containing rice starch, and being administered in gelatine capsules. This attempt ended in failure; the volunteer has now been under observation for two months since the feed, but has not showed *Balantidium* at any time.

It was next decided to feed a second volunteer on cysts discharged in the monkey's faeces. This volunteer's stools were examined microscopically and culturally daily for twelve days before the experiment was commenced; at no time were any protozoa encountered,—the only parasites present being ova of *Ascaris lumbricoides* and *Blastocystis hominis*. About two grammes of a freshly-passed stool were collected in a Petri dish from a *Silenus rhesus*. On thorough examination they showed numerous cysts of the monkey *Balantidium* and more scanty cysts of *Entamoeba histolytica* of the monkey. The stool was emulsified in normal saline, filtered through glass wool, centrifuged, and the centrifuged deposit placed in the cool incubator at 22°C. for 24 hours. On very careful examination of this deposit after it had been cooled, numerous cysts of *Balantidium coli* were found,

and a fair number of cysts of both *Entamoeba coli* and *Entamoeba histolytica* (of the monkey). The centrifuged deposit was now swallowed by the volunteer.

The volunteer's stools were now examined daily. On the eighth day after the infective feed he had loose stools with some abdominal discomfort. Examination of the stools showed a fairly large number of both motile trophozoite forms and cysts of *Entamoeba histolytica*, with some mucus but no blood or cellular exudate. The diarrhoea persisted for one day, but then cleared up without any treatment. This volunteer has now been under observation daily for two months after the infective feed. No balantidium has ever been seen, but he continues to pass *Entamoeba histolytica*, chiefly in the encysted stage, in varying numbers. The strain of *Entamoeba histolytica* is a small one, with cysts down to 6 to 7 microns in diameter. On one occasion he has also shown cysts of *Entamoeba coli*—apparently also of monkey origin.

Although both experiments failed in their original intention, the transmission of infection with *Entamoeba histolytica* from a macaque to man is of interest as affording further proof that this parasite is identical in both the macaque and man. The second volunteer is still under daily observation, and, if possible, it is intended to keep him off all treatment and study the course of this monkey infection in a human host.

Summary

1. The medium advocated by Barret and Yarbrough (1921) proved quite unsuitable in our hands for the cultivation of *Balantidium coli* of macaques.

2. The 'HSre + S' medium devised by Dobell and Laidlaw (1926) for cultivation of the

entozoic amoebae of macaques and man proved an excellent one in our hands for the cultivation of *Balantidium coli* of macaques, provided that a small quantity of acriflavine was added to keep down the growth of starch-splitting bacteria and blastocysts.

3. Division, encystation, excystation and conjugation of the ciliate were observed at the height of the growth.

4. Two attempts to infect human volunteers with cysts of *Balantidium coli* of *Silenus rhesus*, one made with cysts in culture, and the other with cysts in freshly-passed faeces, both failed.

5. In the second instance, however, the *Silenus rhesus* was also infected with *Entamoeba histolytica*, and this infection was transmitted from the monkey to man and has now persisted in the human volunteer for a period of two months.

REFERENCES

- Barret, H. P., and Yarbrough, N. (1921). A Method for the Cultivation of *Balantidium coli*. *Amer. Journ. Trop. Med.*, Vol. I, p. 161.
- Dobell, C. (1928). Researches on the Intestinal Protozoa of Man and Monkeys. *Parasitology*, Vol. XX, p. 357.
- Dobell, C. (1931). Researches on the Intestinal Protozoa of Man and Monkeys. Vol. IV. An Experimental Study of the *Histolytica*-like Species of *Entamoeba* living naturally in Macaques. *Parasitology*, Vol. XXIII, p. 1.
- Dobell, C. (1933). Researches on the Intestinal Protozoa of Man and Monkeys. Vol. V. The Endolimax of Macaques. *Parasitology*, Vol. XXV, p. 436.
- Dobell, C., and Laidlaw, P. P. (1926). On the Cultivation of *Entamoeba histolytica* and Some Other Entozoic Amoeba. *Parasitology*, Vol. XVIII, p. 283.
- Jameson, A. P. (1927). The Behaviour of *Balantidium coli* Malm. in Cultures. *Parasitology*, Vol. XIX, p. 411.
- Walker, E. L. (1913). Experimental Balantidiosis. *Philippine Journ. Sci.*, Vol. VIII, p. 333.

A Mirror of Hospital Practice

ATEBRIN IN HEAVY INFECTION WITH *P. FALCIPARUM*

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LIEUTENANT-COLONEL, I.M.S.

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and

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R., AN ANGLO-INDIAN FEMALE, 59 years old, was admitted into the Carmichael Hospital for Tropical Diseases under the senior author on the 22nd March, 1934, with a temperature of 102°F., and in a low condition. The patient comes from a part of the Central Provinces where a virulent form of malignant tertian malaria prevails. Since her arrival in Calcutta she has suffered from several attacks of fever and has

been treated with injections of quinine and also quinine by mouth. The present attack started three days ago and the fever was continuous. She came into the hospital for treatment.

On admission the patient had a temperature of 102°F. and looked anæmic, weak and debilitated. Physical examination revealed no other abnormality, except that the spleen was just palpable on deep inspiration and that the pulse was of low tension. A blood slide was at once examined for the presence of malarial parasites and a heavy infection with *P. falciparum* was discovered, every field showing approximately fifteen to twenty parasites. The parasites were all ring forms and the developing stages were not met with, even on prolonged examination. A parasite count was made and the patient was put on atabrin—one tablet thrice daily. The blood was examined at frequent intervals when the drug was being administered in order to see the effect on the parasite count and the symptoms. The

results of these observations are given in the following table:—

TABLE

Date	Time of blood examination	Temperature, °F.	Number of parasites per c.mm.	Total amount of atabrin given
22-3-34	6 p.m.	100	180,000 rings	0
	9 p.m.	98.6	162,000 rings	0.1 gm.
23-3-34	12 noon	100	90,000 rings	0.3 gm.
	2 p.m.	99.4	28,240 rings	0.4 gm.
	4 p.m.	99.2	20,000 rings	0.4 gm.
	6 p.m.	99	13,800 rings (degenerating)	0.5 gm.
24-3-34	3 p.m.	98.4	0	0.7 gm.

For the next three days, i.e., 25th, 26th, and 27th, three tablets of atabrin were given daily. The peripheral blood remained entirely free from parasites.

Soon after the commencement of treatment the patient started feeling better, the intense headache, which was the most troublesome symptom, disappeared on the second day, and the temperature settled finally by the third day of treatment. Although the infection was fairly heavy, atabrin checked the multiplication of the parasites and controlled the infection. After four tablets the number of parasites came down from 180,000 to 28,240 per c.mm. with signs of degeneration in the plasmodia; after five tablets the number came down to 13,800; and after seven tablets the parasites disappeared altogether from the peripheral circulation.

Summary and discussion

Chopra and Das Gupta (1933) have shown that the destructive action of atabrin on *Plasmodium knowlesi* is exceptionally powerful. One or two small doses of this drug given intramuscularly or intravenously are sufficient to control a very heavy infection which may amount to a million parasites per cubic millimetre. These workers have further shown (1934) that atabrin has a much more powerful immediate effect on this plasmodium than quinine. In the case described here the plasmodium infection was not so intense as that encountered in the monkey, but it may be described as fairly heavy for man. Atabrin here acted at least as promptly as quinine would have done.

REFERENCES

- Chopra, R. N., and Das Gupta, B. M. (1933). Studies on the Action of Atabrin in Plasmodium Infection of Monkeys. *Indian Med. Gaz.*, Vol. LXVIII, p. 493.
 Chopra, R. N., and Das Gupta, B. M. (1934). Studies on the Action of Quinine in Monkey Malaria. *Indian Med. Gaz.*, Vol. LXIX, p. 195.
 Chopra, R. N., Das Gupta, B. M., and Sen, B. (1933). Atabrin in the Treatment of Indian Strains of Malaria. *Indian Med. Gaz.*, Vol. LXVIII, p. 425.

TREATMENT OF SOFT SORE*

By J. DURLABI DERUV, M.S. (Bom.), F.R.C.S. (Eng.)
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THE treatment of soft sore is notoriously unsatisfactory, and great difficulty is experienced in effecting a cure.

Recently we had a case in which a bubo resulting from infection with Ducey's bacillus had been incised. After the incision the ulcerated area spread slowly but steadily for ten months, so that the skin of the lower abdomen, thigh and perineum were involved in spite of all methods of treatment.

Finally, Dmelcos vaccine was tried. It was given intravenously and the first injection caused a severe reaction, the temperature reaching 105°F. Three more injections were given at intervals and within ten days the ulcer had healed.

Since then we have used this vaccine on several cases of soft sore with uniformly satisfactory results.

[*Note*.—Dmelcos is an 'atoxic vaccine' consisting of several strains of Ducey's bacillus. It is sold in ampoules containing graduated doses for a progressive course of treatment. It is given intravenously.

This is a trade preparation and the name 'Dmelcos' is registered as its trade mark.—EDITOR, I. M. G.]

A CASE OF PSORIASIS OF ENDOCRINE ORIGIN

By BHOLA NATH SHARMA, M.B., B.S.

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A HINDU FEMALE had suffered from extensive psoriasis for about twenty-five years. Hardly an inch of healthy skin could be seen. The patches were typical in their physical characters, except for their distribution, both extensor and flexor surfaces being involved and also every part of the body except a portion of the face, the scalp, and the soles of the feet. The palms were partially involved. The scales were dry, slightly elevated, and covered with typical silvery scales under which the bleeding hyperæmic papillæ could be seen on removing the scales. There was very little itching. The supratrochlear glands and the glands in the posterior cervical triangle and the inguinal region were not enlarged. Kahn's test was negative.

A full course of neosalvarsan injections was given by another practitioner without effecting any appreciable difference.

Later, she developed multiple rheumatoid arthritis, and became bedridden. I prescribed iodide, salicylate, and sulphate of sodium for some days without any benefit. From the patient's age and the fact that she was approaching her menopause I thought that the case was probably one of endocrine origin, ovarian deficiency being responsible for her psoriasis as well as her arthritis. I gave her ovarian substance, and in about twenty to thirty days' time all the patches of psoriasis completely disappeared and her arthritis was also cured.

It is now about three years and her joint trouble has not recurred, but the psoriasis has reappeared. No local treatment did her any good, although on account of the cost of the ovarian therapy she has been using unguentum acidi salicylicæ combined with ehrysophanic ointment.

*Rearranged by Editor.

Another case of psoriasis has recently been sent to me. She was about 35 years of age with a history of irregular scanty menstruation and patches of psoriasis over the limbs and back. Ovarian therapy cleared her psoriasis. She however got menorrhagia. She gave a history of three miscarriages, but neither she nor her children showed any signs of syphilis. Her subsequent history is not known. A point of interest is that endocrine therapy appears to produce its effect for a time only.

In both these cases there was marked eosinophilia. The stools showed no ova, but cysts of *Entamoeba histolytica* were present in the second case.

A CASE OF CHOLERA SICCA*

By MURARI MOHAN ROY, L.M.F., L.T.M.

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A HINDU MALE, aged 36 years, went to a *mela* during the Holi festival on 1st March, 1934. On the night of 2nd March, he vomited three or four times; he did not regard this seriously. On 3rd March at noon he began to vomit vehemently and his urine became suppressed. He had severe cramps in the muscles of the hands, legs and feet. He called in a homœopath, who prescribed medicines for acidity which did no good to the patient. Early next morning, on the 4th March, I was called for. I found the patient in a pulseless condition, with respiration slightly increased; cramps in the legs, feet and hands were very severe and he was vomiting frequently.

I diagnosed the case as one of cholera sicca, and as I had not the apparatus for giving saline intravenously I prescribed saline injection per rectum, hoping this would be of some benefit as there was no evacuation of the bowels. I injected atropine sulphate gr. 1/100 for the cramps and prescribed a mixture with acid sulphuric aromatic and stimulants, and a powder with calomel, camphor and sodium bicarbonate.

In the afternoon it was reported that the cramps and vomiting still continued. I saw the patient again and found that the pulse had reappeared, and frequency of vomiting was rather less, but the cramps were still very severe, the abdomen tympanitic, the urine still suppressed and the bowels had not moved as yet. The skin of his hands and feet was shrivelled and wrinkled.

I injected one pint of normal saline with sodium bicarbonate intravenously, gave another dose of atropine sulphate gr. 1/100, and prescribed caffeine and sodium benzoate, 5 grains in 2 cubic centimetres, for removing suppression of urine. The mixture and powder were repeated.

The next morning it was reported that the cramps had totally ceased during the night, and that the patient had passed urine three times after 32 hours' complete suppression. The bowels did not move throughout the period. From that time convalescence was uneventful.

A LARGE URETHRAL CALCULUS

By H. J. H. SYMONS

MAJOR, I.M.S.

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A PATHAN, aged 50 years, came to the outpatient department at the municipal hospital, Dera Ismail

Khan, on 15th February, 1934, with the complaint that for the previous six months he had had difficulty in passing urine, much straining on micturition and considerable discharge of pus from the urethral meatus.

On examination it was seen that his scrotum was not of normal shape and on palpation a stony hard mass was felt in the middle line filling partly the perineum and partly the posterior portion of the penis. There was a considerable discharge from the meatus and when a sound was passed it impinged on a stone about three and a half inches from the meatus. The stone could be slightly moved laterally but not antero-posteriorly.

Under general anaesthesia an incision two and a half inches long was made in the middle line down to the stone, which was easily removed. The cavity in which the stone had lain was thoroughly inspected and was found to be lined throughout with mucous membrane; it appeared to be simply an enormously dilated portion of the urethra and not a diverticulum. A sound was passed into the bladder and no calculus was detected in that organ.

A large rubber catheter was passed from the meatus and inserted into the urethra at the proximal end of the dilatation and thence pushed into the bladder. The incision in the mucous membrane of the dilated urethra was sutured with fine catgut. The skin and fascia were united with interrupted silkworm gut sutures. His friends removed the rubber catheter overnight; this necessitated the introduction of a silver instrument early next morning and its retention for a few days, but he made an uneventful recovery, the wound healing by first intention.

After the act of micturition he is unable to empty the dilated portion of his urethra and he has been advised to empty this by external pressure on every occasion. About one ounce is expressed in this way.

A photograph of the calculus is shown with a rupee for comparison as to size. It weighed 850 grains avoirdupois, was 2½ inches in length and 3½ inches in circumference at the largest point.



Before operation the patient asserted that his discomfort was of only six months' duration. After the removal of the calculus and on its being shown to him he was induced to alter his previous statement and said that it had worried him for probably ten years.

Pathans are notoriously long-suffering, but it is remarkable that anyone, even a trans-border Pathan, should put up with the discomfort that such a stone would cause for as long a period as ten years.

Le Comte (1929) described seven cases of urethral stone, and stated that some stones have remained in the urethra for twenty years.

REFERENCE

Le Comte, R. M. (1929). *Ann. Surg.*, March, p. 400.

Indian Medical Gazette

JULY

GRANULOMA VENEREUM

In a recent monograph on lymphogranuloma inguinale, the author claims a common ætiology for this disease, climatic bubo, esthiomene, and certain other genital and anal affections that have hitherto been considered individually, and suggests for them the name 'a sixth venereal disease'. The position of 'fourth venereal disease' has already been claimed for a genital infection by Vincent's bacillus, and the fifth position is thus left open for ulcerating granuloma of the pudenda, or granuloma venereum, as it is now almost universally called. Thus, if the extra-venereal origin of this last-named disease is established, not only will a revision of its own name be entailed, but it will then be necessary to promote lymphogranuloma inguinale to the fifth position, and a very serious dislocation in medical nomenclature will be caused!

Nobody will, we feel sure, deny that there is a *prima facie* case for the venereal origin of this granuloma, and, although at the present there appears to be a slight swing of the pendulum of medical opinion against the venereal hypothesis—the writers of an article on this subject in our present issue have very definitely ranged themselves with this reactionary element—the name granuloma venereum is so firmly established in the literature that, until the 'extra-venereal' school has established its case and from an exact knowledge of the ætiology of the condition has provided a more suitable name, the present one must stand.

In India this disease seems to be confined to the eastern side of the peninsula proper, that is to say, more or less to the Madras Presidency. Thus, in the hospitals in Madras city and in Vizagapatam there appears to be little difficulty in collecting a considerable number of cases; but on the other hand the disease has been encountered only very rarely in the large skin outpatient department of the Calcutta School of Tropical Medicine, and few cases have so far been reported from other parts of India.

Although the ætiology of this disease is not yet clear, one fact stands out—the Donovan organisms are such a constant histological finding in the typical ulcer that one is justified in demanding their demonstration in every case before it can be definitely labelled as granuloma venereum. Thus it seems certain that this micro-organism (and micro-organism it appears to be though the suggestion has been

put forward that it is a cell-inclusion body, i.e., evidence of cellular reaction to an unidentified virus) plays a part in the ætiology of the disease, there is however no evidence that it is the primary invading organism, or even that it is the only organism maintaining the specific nature of the lesions. Some workers, using a large variety of culture media and methods, have failed to grow the Donovan organism, and yet others have obtained growths that they claim were of this organism, constantly and apparently without much difficulty. Regarding the nature of these cultural forms there does not seem to be complete uniformity of opinion amongst different observers; it has been described variously as a capsulated diplococcus, a diphtheroid and a coccobacillus? For these isolated organisms some pathogenicity is usually claimed, but in no instance has the typical—either clinical or histological—lesion been produced; these failures include a number of human experiments. On the other hand a greater degree of success has been achieved, in both man and macaques, by inoculating with scrapings from the human lesions. In these experiments typical, though transient, granulating lesions were produced, and in the scrapings from these induced lesions the Donovan organisms were seen in their characteristic intracellular and encapsuled formation.

To return to the question of the venereal origin of these lesions, the *prima facie* case is that we have an infective disease, occurring in both men and women, that is confined mainly to the genital area. The fact that extra-genital lesions occur is no argument against the venereal hypothesis. Primary chancres have been reported in many unusual sites—but in this case it is not even necessary to indict human society, as with very few exceptions the extra-genital lesions are secondary to genital lesions, or to lesions in the genital area that could have been acquired during the normal sexual act. This applies in every case both in the Vizagapatam series, reported elsewhere in this issue, and in the Madras series reported in our January number last year. Thierfelder discussing a series of 6,000 cases only reports two in which there were no associated genital lesions, and in both of these he was able to trace the lesions to irregular practices. The occasional incidence of these extra-genital lesions adds strong support to the venereal hypothesis, as it demonstrates that the skin and muco-cutaneous junctions in other parts of the body are susceptible to the infection, but that in actual experience they are very rarely the site of primary infection. Conversely, the argument put forward by Drs. Nair and Pandalai, that if the disease were of venereal origin one would expect to find lesions on the cervix uteri and in the vaginal fornices, is entirely negatived by the observation, which they themselves emphasize, that, even when the

whole circumference of the vagina is extensively diseased, the infection does not spread far along the vaginal walls. Or, in other words, it is a disease with a predilection for the skin and muco-cutaneous junctions, but not for mucous membranes.

On the other hand the infrequency of this disease in the other partner when a married patient is infected is difficult to explain, on the venereal hypothesis. A possible explanation is that the disease is only infectious in an early stage; such an explanation would add support to the suggestion put forward by some American workers and adopted by Dr. Bhaskara Menon in Madras that there is always a primary genital lesion, a small ulcer, which is not very characteristic clinically and is consequently often overlooked, and that the typical granuloma is a secondary lesion. This primary lesion may be highly infectious and the secondary granulomata much less so.

Although we do not take the view that the discussion, the venereal *versus* the extra-venereal origin, is closed, we do consider that at present the evidence is so much in favour of the former hypothesis that tampering with the nomenclature is not yet justified.

* * * * *

There seems to be little doubt that antimony is a specific for the disease; the only question that arises is what is the best form in which to administer it? Sodium antimony tartrate is the drug that has been used most extensively up to the present.

The introduction, in 1915, of sodium antimony tartrate in the treatment of kala-azar, constituted one of the greatest advances in the treatment of tropical diseases that had been made for many years, yet to-day the pentavalent compounds of antimony have proved so infinitely superior that nobody now advocates sodium antimony tartrate in this disease. This superiority of the pentavalent compounds surprised chemotherapeutists, as, on analogy with arsenic, the trivalent compounds were expected to be therapeutically more active; these expectations were supported by chemotherapeutic trials in animal trypanosomiasis. Consequently, a number of trivalent aromatic compounds were tested by the workers at the Calcutta School of Tropical Medicine. Antimosan was tested as long ago as 1923 and was found, though therapeutically active in this disease, to be little superior to sodium antimony tartrate. Shortly afterwards Fouadin, a closely-allied trivalent aromatic compound, was also tested and a similar conclusion arrived at.

In the treatment of oriental sore, cutaneous leishmaniasis, sodium antimony tartrate was found to be efficacious and it was expected that the pentavalent compounds would be as corresponding more so as they had proved to be in the treatment of kala-azar, *i.e.*, visceral leishmaniasis, but analogy was again misleading, and it

was soon found that in this infection the pentavalent compounds were certainly no better and possibly not as good as the trivalent compounds, antimosan and Fouadin, or even the trivalent salt, sodium antimony tartrate.

In the literature on the treatment of granuloma venereum during the last few years there have been occasional references to the possible superiority of the pentavalent antimony compounds, but we have felt that had this superiority been real it should have been quite definitely established by now. We noted therefore, with particular interest last year, the paper by Williamson and his colleagues who reported excellent results with the trivalent aromatic compound, Fouadin. Elsewhere in this number will be found a paper by Dr. Rajam of Madras, confirming these observations of the American workers. This paper is of particular interest because kala-azar occurs in Madras and some hundreds of cases of this disease are treated each year in the hospitals in that city by pentavalent antimony compounds which will therefore most certainly have been given a thorough trial in granuloma venereum, as the writer indicates. These two papers report such satisfactory results with Fouadin that we shall not be surprised to see sodium antimony tartrate displaced by the trivalent aromatic compounds in the treatment of this disease in the way that it was displaced by the pentavalent aromatic compounds in the treatment of kala-azar. Fouadin has the advantage that it can be injected intramuscularly, whereas the closely-allied compound antimosan has to be given intravenously. Other trivalent compounds have also been prepared and should be given a trial, as experience has shown that small differences in composition occasionally make great differences in therapeutic efficacy.

Medical News

BRITISH POST-GRADUATE MEDICAL SCHOOL

CERTAIN recent announcements may justify a review of the circumstances which gave rise to the institution of this school.

London has long been realized to have a remarkable, indeed almost unique, supply of clinical material. Of this advantage should be taken not only in the training of medical students by undergraduate schools but in addition by the provision of courses for doctors resident in Great Britain, in the Empire beyond the seas, and abroad, who wish to refresh their knowledge, to obtain instruction in new developments of medicine, surgery, and obstetrics, or to participate directly in the clinical practice of a hospital.

Attempts to utilize this abundant material are by no means new. In the closing years of the last century the Medical Graduates College and Polyclinic was set up largely through the activities of Sir Jonathan Hutchinson. This organization was of great value to London practitioners, but was not run in connection with any one particular hospital, and, although there were associated with it classes in certain special hospitals and medical schools, it could not provide that regular attendance at in- and out-patient departments

which may be looked on as the principal requirement of the general practitioner and the more specialized post-graduate student.

With the next stage of the development should be remembered the name of Sir William Osler. Among others, many of whom are fortunately still with us, he made possible the formation of the Fellowship of Medicine and Post-graduate Medical Association. During the years which have since elapsed many practitioners have been thereby enabled to take advantage of the instruction provided at the various London teaching hospitals. This organization is still very active and does most valuable work, and there has been no falling off either in the facilities which it offers or in the numbers who have taken advantage of those facilities. Nevertheless, the Fellowship of Medicine suffers in some measure from not having any one hospital with which it is particularly associated and thus it has no really adequate centre for its activities.

A committee was appointed by the government in 1932 to go into the question of post-graduate teaching in London, and, to cut a long story short, one of the results of this report has been the present scheme by which an existing hospital at Hammersmith is being taken over and converted into a leading hospital, and a medical school for post-graduate teaching is being built on to it. A short description of the medical school is here given:—

On the ground floor there are the offices including accommodation for the Dean, for clerical staff, etc., and a committee room. These take up one side of the square, while the north side is chiefly occupied by the post-mortem department with an associated laboratory and class-room for histological work. Opening off the main corridor is the clinical theatre (with accommodation for close on 100 students) and rooms for the examination of patients and for the lecturers. The remaining side is chiefly devoted to a large chemical laboratory with centrifuge, polarimeter and balance rooms.

The second floor can be described more briefly: above the clinical theatre is a somewhat larger lecture theatre (both of these include full provision for the projection of cinematograph films), while over the school offices are to be found a well-lit library and two rooms for the use of the teaching staff. The remainder of the floor is devoted chiefly to five medium-sized laboratories and six smaller rooms, each of the latter suitable for a single worker. There is in addition a large museum with windows on two sides and top lighting in addition. The top or third storey is slightly smaller; it contains bacteriological laboratories, autoclave rooms, and two smaller laboratories. To turn now to the southern half of this new block—a part which belongs more closely to the hospital—on the ground floor there will be a large and carefully planned outpatient department. The main hall is lit from above and will accommodate about 300, while opening off it are various consultation and examination rooms and a theatre for minor operations. Adjacent to the general outpatient hall but with a separate entrance is the ante-natal care department, while also on the ground level are two small wards available for casualties. Though provision has been made for later expansion upwards as occasion arises, there are for the present to be only two stories in this part of the building. The upper floor is chiefly devoted to an x-ray department, on the one side to investigation work, *e.g.*, screening and photography, and on the other to therapy.

The London County Council proposes to send from their other hospitals to Hammersmith any patients who might be expected to benefit by the facilities there provided for specialized treatment or investigation and diagnosis.

The outpatient department is not the only substantial addition to the hospital; there is also being erected a new block, chiefly for maternity cases, well provided with delivery rooms, operating theatres, etc.

The London University has 'recognized' the new institution as a School of that University. There will be four professorships, three in the main clinical subjects—medicine, surgery, and midwifery and gynaecology—and the fourth in pathology. The former group will have general charge of the beds in the hospital which are devoted to their various subjects and will also be provided with facilities for original investigations in medical science. The 'research' accommodation will, of course, be supplemental to the laboratories required no less than lecture rooms for the teaching of the post-graduate student. The department of pathology no doubt requires rather more generous laboratory accommodation and equipment but this subject now includes at least three main divisions: (1) morbid anatomy; (2) biochemistry, including pathological chemistry, and (3) bacteriology.

When it has been possible to select the holders of the chairs, and these posts have now been advertised, the next stage will be to proceed to the more detailed organization of each teaching 'team' for we must presume that assistants of various grades will be needed in each unit. It may be anticipated that courses will also be delivered from time to time by eminent physicians and surgeons not permanently attached to the school.

It is of the first importance that the teaching should be of a really high level—suitable for increasing the knowledge of the better grade of medical practitioners. The provision of 'refresher courses' may well be regarded as an important item in the activities of the comprehensive post-graduate scheme. Such courses should be particularly adapted to the needs of men who are working in sparsely-populated rural areas and who have not reasonable access to a town in which hospital practice is available. Nevertheless this type of activity should not be allowed any chance of 'swamping' the more advanced work which may be expected to appeal more particularly to graduates proposing to specialize in some one branch of medical practice. For these, courses of an essentially different character will be needed.

It is not to be expected nor indeed is it desirable that the whole of post-graduate teaching in London should be transferred to Hammersmith. Such a plan would overlook the abundant clinical material and teaching ability which are to be found in the existing special and general hospitals, and which have, chiefly through the activities of the Fellowship of Medicine, been made largely available, for example to medical graduates from overseas. Rather is it to be hoped that the new school will act as a centre and that a cordial relationship will be maintained with other institutions and their valuable and generous work.

The school has an Imperial side since nowhere more keenly than in the great Dominions is the desire felt that it should be possible for medical men to find in London and among their own folk access to the latest knowledge and the most recent developments of medical technique. It also may claim to have a distinctly international side since in countries like the United States of America and the Argentine (to mention only two) the desire for such an institution in London is constantly expressed.

INDIAN MEDICAL BIRTHDAY HONOURS, 1934

The following are the names of medical men and others, associated with medical institutions, in the Indian Honours List of date 4th June, 1934. We would offer them our congratulations:

Knighthood

Major-General J. D. Graham, Indian Medical Service (retired), lately Public Health Commissioner, Government of India.

Dr. Upendra Nath Brahmachari, Medical Practitioner, Bengal.

C.I.F.

Lieutenant-Colonel J. A. S. Phillips, Indian Medical Service, Director of Public Health, Bihar and Orissa.
Lieutenant-Colonel H. H. King, Indian Medical Service, Director, King Institute, Guindy, Madras.

O.B.E.

Mr. Abdur Rahman, Director of Public Health, Punjab.

M.B.E.

Mr. W. A. Beer, Assistant to the Director, Pasteur Institute, Coonoor, Nilgiris, Madras.
Major F. H. Otto, Assistant Surgeon to the Port Health Staff, Bombay.
Mr. G. O. Schmidt, Assistant Surgeon, British Consulate, Kashgar.

Kaisar-i-Hind (Gold Medal)

Miss L. A. Benjamin, Superintendent, American Baptist Mission Hospital, Nellore, Madras.
Miss D. L. Graham, Medical Missionary, Krishnagar, Bengal.
Miss M. C. Webb, Chief Medical Officer, Women's Medical Service, and Secretary of the Funds under the Presidency of the Countess of Willingdon.

Kaisar-i-Hind Medal (Second Class)

Miss H. C. Binns, Nursing Superintendent, General Hospital, Rangoon.
Mrs. M. Simpson, Sister Superintendent, Civil Hospital, Jalgaon, Bombay.
Mr. A. Murray, Dentist, Burma.
Mr. P. C. Sen, Health Officer, Dacca Municipality, Bengal.
Mr. M. L. A. Steele, Indian Medical Department, Medical Officer, Bushire, Persian Gulf.
Mr. H. S. Thomas, First Assistant, Albert Victor Hospital, American Madura Mission, Madura, Madras.

Kaisar-i-Hind Medal (Third Class)

Miss A. C. Johnstone, retired Assistant Surgeon, Rampur State.
Miss A. M. Richards, Lady Superintendent, Lady Barton Child Welfare Centre, Secunderabad.
Mr. P. T. Jesudoss, Medical Officer of Health, Secunderabad Cantonment (Deccan).
Maulvi Habibur Rahman, Assam Medical Service (junior), Sub-Assistant Surgeon, Assam.
Mr. H. R. Wadhvani, Medical Practitioner, Bombay.
Subedar Abdul Wahid, Indian Medical Department, Military Sub-Assistant Surgeon.

I.S.O.

Lala Ram Sahai, Sub-Assistant Surgeon, Residency Hospital, Indore, Central India.

Khan Bahadur

Khan Sahib Jehangir Dhanjibhai Buxy, Deputy Director of Veterinary Service (retired), Bombay Presidency.
Munshi Mohammed Alunad Ali Shah, Honorary Dentist, Bahrampur Hospital.
Dr. Abdul Hamid Butt, Director of Public Health, Lahore.
Maulvi Mohammed Sulaiman Ashrof, Officiating Civil Surgeon, Palaman, Bihar.

Rai Bahadur

Captain Shyam Lal, Civil Surgeon, Ballia, United Provinces.
Rai Sahib Chhagan Nath, Assistant Surgeon-in-charge, Lansdowne Hospital, Udaipur.

Rao Bahadur

Mr. Natsingrai Bababhai Majumdar, Bombay Medical Service, Class I.

Khan Sahib

Ashban Padabhai Patel, Subordinate Medical Service, Dandi, Bombay Presidency.
Mr. Mohammed Abdul Kadir, Assistant Director, Veterinary Service (retired), Central Provinces.
Yusuf Ali, Civil Sub-Assistant Surgeon-in-charge, Lady Minto Hospital, Malakand, North West Frontier Province.

Rai Sahib

Lala Poran Mal, Provincial Subordinate Medical Service, Medical Officer, Basia Dispensary, Ballia District (United Provinces).
Lala Hans Raj Bhanbi, Sub-Assistant Surgeon, Punjab.
Dr. Abani Nath Chatterjee, Personal Assistant to the Director of Public Health, Bihar and Orissa.
Mr. Nalinendra Kishore Ghosh, Assam Medical Service (senior), Assistant Surgeon, Public Health Department, Assam.
Lala Saraj Narain Mathur, Assistant Surgeon, Victoria Hospital, Ajmer.
Mr. Raghunath Singh, State Surgeon, Alwar State, Central India.
Kari Tomyot Tserin, Sub-Assistant Surgeon, Tatsung, Tibet.
Sachchidananda Banerjee, Assistant Surgeon, East Indian Railway, Jamalpur.

Rao Sahib

Jemadar Ramisetty Subbaya, Indian Medical Department, Sub-Assistant Surgeon, Bahaduristan.
Joachim D'Costa, Temporary Deputy Director, Imperial Veterinary Serum Institute, Ichalmgar.

INTERNATIONAL UNION AGAINST
TUBERCULOSIS

The ninth Conference of the International Union against Tuberculosis (General Secretary, Professor Leon Bernard) will meet in Warsaw on 4th, 5th and 6th September, 1934, under the high patronage of His Excellency the President of the Republic of Poland and under the Chairmanship of Professor Plezzyński, President elect of the International Union. The discussion will be limited to three main subjects: Biological subject: 'Biological variations of *tubercle virus*', opening report by (Poland); Clinical subject: 'Tuberculosis of the lungs and joints; treatment, medical report by Professor Putti (Italy); 'The use and organization of the conference', opening report by Professor La Ten speakers, selected in advance by the forty-three countries to have been designated to open 1 of the questions on the agenda.

The Organization Committee has prepared a very attractive program and exemptions; the latter will call Congress to visit the chief anti-tuberculosis as well as the most picturesque scenery of Poland.

Members of the International Union take part in the Conference free of fee. They may forward their applications through the medium of their National Tuberculosis, or directly to the Office in Warsaw, at the following address.

Organizing Committee of the 9th of the International Union against Tuberculosis, Street 24, Warsaw, Poland.

Persons who are not members of the Union wish to take part as 'Members

must forward their application together with a contribution fee of 50 zlotys exclusively through the medium of:—

Indian Red Cross Society,
(King George Thanksgiving Fund),
Talkatora Road, New Delhi.

Reductions in hotel prices and railway fares will be granted to Members of the Congress.

PRIMARY F.R.C.S. ENGLAND

Two years ago when Major-General C. A. Sprawson, the present Director-General, Indian Medical Service, was in Madras, he and the Principal of the Medical College of Andhra University began a correspondence with the Royal College of Surgeons of England with a view to having a Primary Examination in Anatomy and Physiology for the Fellowship of the College conducted in India. The object of this was to obviate the necessity for candidates from the universities of India having to go to England in the middle of their course, as well as to diminish the expenditure of the individual candidate, and so enable those students who were not well off to be placed in a better position to obtain the higher qualification.

A cable from the Secretary of the College of Surgeons has been received agreeing to send examiners to conduct such an examination in India in the third week of December of this year, conditional on not fewer than thirty candidates being forthcoming. Though the examination is not to be held until December, it is necessary that the number of candidates should be known and the fees deposited before the end of July, otherwise arrangements cannot be made in London in time.

In order to cover the expenditure required for such an examination it would be necessary that every candidate who proposes to enter for the examination should send Rs. 360 (Rupees three hundred and sixty only) with his name and address when the exact date and place of examination would be communicated to him.

Students or graduates who wish for further information on the subject should communicate with Mr. F. Macrae, c/o the Director-General, Indian Medical Service, Gorton Castle, Simla.

PUNJAB MEDICAL COUNCIL

The following is a summary of the proceedings of the Punjab Medical Council held on the 14th April, 1934, at 11 a.m.:—

(1) Notifications regarding the appointment of the following members were read and recorded:

Colonel C. H. Reinhold, as President,
Lieutenant-Colonel T. A. Hughes,
Khan Dr. Khavja Abdul Rahman Bahadur.

(2) It was decided to approach Government with the request that a register for qualified dispensers and dressers be opened on the lines of the Punjab Medical Register.

(3) It was decided that the registered medical practitioners should not be allowed to associate their names with firms of chemists and druggists.

(4) Court judgments in the various cases conducted against bogus medical practitioners were read and recorded.

(5) A letter from the general secretary of the All-India Medical Licentiate Association requesting that increased representation be given to licentiates on the Punjab Medical Council was considered and it was decided that up-to-date enquiries be made from other provincial medical councils in India in regard to the number of licentiates who are members of the various provincial medical councils, and the replies received be placed before the next meeting.

MASULIPATAM MEDICAL ASSOCIATION

The first anniversary of the Masulipatam Medical Association was held under the presidentship of Dr. D.

S. Ramchandra Rao, M.A., M.D., in the local Town Hall on the 16th April, 1934.

Dr. P. R. Venkataramayyar spoke on 'Medical Fraternity'. Dr. M. Seshacharyulu read a paper on 'Dynamic Physiology', and Dr. R. Venkata Rao on 'Duodenal Ulcer'. An interesting case of 'Tumour of the Liver' was demonstrated by Dr. A. Umapathi Mudaliar.

Elections were held for the ensuing year and Dr. P. R. Venkataramayyar was elected as President, Dr. K. Sithapathi Rao as Vice-President, and Dr. A. Seshagiri Rao as Secretary. The function came to a close with a dinner which was well attended.

BRITISH INDUSTRIES HOUSE

NEW MEDICAL CENTRE

UNUSUAL interest is being taken in the Medical Centre which is being established in London. The enterprise is one which will tend to revolutionize the administration of our hospitals and, at the same time, result in the development of an industry of world-wide importance.

The successful achievement of the objects in view is rendered highly probable by the fact that the Centre is to be conducted under the guidance of a Medical Advisory Council, which has been formed with Dr. Alfred Cox, for twenty-one years secretary of the British Medical Association, as chairman, Sir Crisp English, Dr. E. P. Poulton, and Mr. A. R. McWhuish, M.R.S., past president of the Pharmaceutical Society of Great Britain. The association of the names of these gentlemen with the movement may be accepted as assuring that it will be planned and conducted on lines which are bound to be approved by the medical and pharmaceutical professions.

There are in Great Britain 4,000 important public and voluntary hospitals and many thousands of nursing homes, while there are 42,000 members on the Medical Register. There are some 250 retailers of surgical instruments and hospital equipment.

The retailer does not claim to be the actual manufacturer of all the articles which he offers for sale and which are called for by the hospital purchaser or general practitioner.

Take enamel ware, for instance. This is a speciality of the Wolverhampton district, although such goods are also made in various parts of the country. The retailer will make his own arrangements with two or three, or probably more, manufacturers of such goods and will submit the articles to his customer.

Another retailer will have similar arrangements with two or three other firms. The result is that the purchaser from abroad visiting this country and wishing to see a comprehensive range of hospital enamelled ware utensils, must, of necessity, visit half-a-dozen retailers in London and the provinces, and even then probably find it necessary or desirable to go over the whole gamut again and visit manufacturing firms from Glasgow to the South of England.

It must be realized that a hospital buyer, more particularly from abroad, would very rarely visit this country for the purpose of placing orders solely for enamel ware. His list of requirements would usually comprise quite a large variety of articles, such as operating tables, sterilizers, forceps, electrical apparatus, and so forth, with the result that the same process has to be gone over again in regard to each article required, if he is to return to his headquarters and report that he has made a comprehensive examination of the range of goods available from British manufacturers.

Such a condition of affairs could never exist in any industry unless the commercial aspect were regarded as of only secondary consideration.

The section will be opened on Wednesday, 18th July, just before the opening of the Annual Meeting of the British Medical Association at Bournemouth. Doctors, pharmacists, and hospital managers, as potential buyers, will be admitted on presentation of

their cards. Any of our readers who may be in England will, we are assured in a letter from Dr. Alfred Cox, be welcomed at all times at the section. We feel sure that the project will be a useful one, and will be warmly welcomed by all who have ever had to spend their time in journeying to various places in order to examine goods of British manufacture in which they are interested.

THE FORTY-THIRD CHEMISTS' EXHIBITION, LONDON

The Chemists' Exhibition, organized by the *British and Colonial Pharmacist*, was established in 1896 in

London, and there is nothing approaching it in size and comprehensiveness held anywhere else in the world. It was organized to give the chemist and druggist an opportunity each year of seeing, under one roof, all the goods he sells and the various apparatus, utensils and other requisites he uses in his profession. The management is always delighted to welcome visitors from the Dominions and Colonies, and such gentlemen will be admitted on presentation of business cards. The Exhibition has grown continuously and this year will be housed from 24th to 28th September in the New Hall of The Royal Horticultural Society, Westminster, S.W. 1, in the very heart of London, practically under the shadow of the Houses of Parliament and Westminster Abbey.

Current Topics

Pseudo-Ephedrine in Asthma

By G. W. BRAY, M.B. (Sydney), M.R.C.P. (Lond.)
and

L. J. WITTS, M.D. (Manch.), F.M.C.P. (Lond.)

(Abstracted from the *Lancet*, Vol. I, 4th April, 1934, p. 788)

THE graphic formula of ephedrine contains two asymmetric carbon atoms, so that two sets of stereoisomers, making six in all, are possible. Only two occur in nature, *l*-ephedrine, which is the ephedrine in general use, and *d*-pseudo-ephedrine, which is usually known as pseudo-ephedrine. Different species of the ephedra plant contain different amounts of these two alkaloids, and there would be a great saving in cost if they could be used interchangeably. It has hitherto been believed that the action of pseudo-ephedrine is identical with that of ephedrine, but weaker (Chen and Schmidt, 1930). In 1931, however, Chopra and co-workers reported that ephedrine and pseudo-ephedrine were equally effective in the treatment of asthma, but that the latter caused fewer unpleasant side actions. This is the statement we have endeavoured to test.

Ephedrine is of little assistance in a severe paroxysm of asthma or in the status asthmaticus, but it usually aborts a mild attack if taken early, and it usually relieves a moderate dyspnoea. It is therefore a valuable drug in the treatment of asthma, as an intelligent patient can often stave off a severe attack by its use. The unpleasant side actions of ephedrine are familiar to all who treat asthmatic patients. Most common are palpitations, trembling, weakness, sweating, feelings of warmth, chilly sensations, nausea, and vomiting, and the *tousse éméétique*. Less common are nervousness, headache, insomnia, dyspnoea, a tired feeling, thirst, drowsiness, precordial pain or distress, flushing, tingling or numbness of the extremities, anorexia, constipation, diuresis, and dysuria. These side actions are most evident at the beginning of treatment with ephedrine, and it is usual for tolerance to them to be developed, and for the patient to be able to continue the use of ephedrine with relief of the asthma and without the unpleasant side actions. In rare instances, however, toxic symptoms suddenly appear in a patient who has tolerated ephedrine well for months or years.

In the following experiments the relative value of ephedrine and pseudo-ephedrine has been assessed in two ways: (1) by the diminution in the number of attacks produced by continuous administration of the drugs; and (2) by the relief of the actual paroxysm by the administration of the drug at the onset of the attack.

PREVENTION OF ATTACKS

These experiments were carried out by one of us (G. W. B.) at the asthma clinic at the Hospital for

Sick Children, Great Ormond Street, W.C. Twenty children, 12 boys and 8 girls, aged from four to nine years, were chosen who had (a) had their asthma for at least two years, (b) had attacks more or less all the year round, and (c) had not previously had hospital treatment. These children were divided into four groups of 5 children and observed during alternate control periods, periods while taking ephedrine regularly, and periods whilst taking pseudo-ephedrine regularly. The dosage employed was a quarter of a grain morning and evening for a child under seven years, and gr. $\frac{1}{2}$ morning and evening for a child over seven years. The mothers were instructed to give an additional tablet whenever an attack threatened. During the control period all the children had two teaspoonfuls of water just coloured with burnt sugar three times a day. No other treatment, anti-asthmatic or otherwise, was given.

Group 1 had four months control period, four months on pseudo-ephedrine, and four months on ephedrine.

Group 2 had four months control period, four months on ephedrine, and four months on pseudo-ephedrine.

Group 3 had two months control period, two months pseudo-ephedrine, two months ephedrine, two months pseudo-ephedrine, two months ephedrine, and two months pseudo-ephedrine.

Group 4 had two months control period, two months ephedrine, two months pseudo-ephedrine, two months ephedrine, two months pseudo-ephedrine, and two months ephedrine.

By this means it was possible to compare the efficacy of the drugs with each other and with a control period without anti-asthmatic treatment, and at the same time to eliminate any seasonal variations that might occur.

In summary, the 20 cases during twelve months control period had 49 attacks; in eighteen months on ephedrine they had 78 attacks; and in eighteen months on pseudo-ephedrine they had 52 attacks. Or, expressing the figures in the same ratio as regards time, control: ephedrine: pseudo-ephedrine = 100: 107: 73. In other words, whilst the administration of ephedrine did not diminish the number of attacks the administration of pseudo-ephedrine to the same cases and during the same period showed a 27 per cent reduction of the number of attacks. As regards the severity of the attacks, they were most severe in the control periods, less severe whilst taking ephedrine, and least severe whilst taking pseudo-ephedrine in almost all cases.

Hence one may conclude that pseudo-ephedrine is a more efficacious drug than ephedrine in lessening the frequency of the attacks. Neither drug, if continuously administered, will prevent asthma. In two cases the asthma remained continuous in spite of gr. $\frac{1}{2}$ three times a day in children of seven years. Hence, as both ephedrine and pseudo-ephedrine were used, and the attacks ceased immediately after 5 minims of adrenaline

chloride solution had been given hypodermically, neither can replace adrenaline in allaying a severe attack.

One girl of ten years always had sickness and palpitation whilst taking ephedrine but not on pseudo-ephedrine. A boy aged eight years was always made sick by ephedrine gr. $\frac{1}{2}$ but could take the same dose of pseudo-ephedrine quite well. A male of seven years became sick, languid, and listless after ephedrine gr. $\frac{1}{2}$, and complained of palpitation each time. He took pseudo-ephedrine gr. $\frac{1}{2}$ night and morning quite well for two months during which time he had one severe attack lasting four days. Though no sickness or palpitation occurred between attacks, during attacks the tablets made him sick each time for a quarter of an hour, but there was no palpitation. Hence one may conclude that pseudo-ephedrine is less toxic to children than ephedrine in the same dosage.

RELIEF OF PAROXYSMS

These experiments were carried out by L. J. Wits at the asthma research clinic at Guy's Hospital. The standard dose of ephedrine hydrochloride was gr. $\frac{1}{2}$, to be taken as early as possible in the attack and to be repeated at hourly intervals if necessary until grs. 1½ had been taken. If relief was not obtained with this dosage it was rarely possible to improve the results by increasing the dose, on account of the supervention of toxic symptoms. In a few cases, however, the patient had an unusual tolerance for ephedrine, and occasional patients have taken as much as grs. 9 a day with benefit. An analysis of 60 adult patients, who used ephedrine in this way, was as follows:—

- 28 were relieved by ephedrine and experienced no unpleasant side actions.
- 23 were relieved by ephedrine but experienced unpleasant side actions.
- 7 were unable to take ephedrine on account of the severity of the reactions.
- 2 were totally unaffected by ephedrine.

It was soon found that pseudo-ephedrine had a weaker action than ephedrine. The standard dose of pseudo-ephedrine was therefore fixed at gr. 1, repeated at hourly intervals, if necessary, until grs. 3 had been taken. It was seldom possible for the patient to take a total of more than grs. 4½ of pseudo-ephedrine during an attack without the supervention of toxic symptoms. Reactions to pseudo-ephedrine, when a dosage larger than the standard was employed, were sensations of cold shivering, dilatation of the pupils, insomnia, lack of energy, drowsiness, palpitation, nausea and vomiting, and dysuria. The side actions of pseudo-ephedrine are therefore the same as those of ephedrine, but nausea and vomiting are more common.

In the first place the therapeutic effect of pseudo-ephedrine was studied in 21 adult patients, who had previously used ephedrine. In 15 of these 21 patients the asthma was relieved by ephedrine, but there were moderately unpleasant reactions; the remaining 6 patients were unable to take ephedrine on account of the severity of the side actions. The results with pseudo-ephedrine in these 21 cases were as follows:—

- 3 obtained relief from their asthma without any side actions.
- 5 obtained only slight relief from their asthma, but there were not side actions. Nevertheless these 5 patients preferred the stronger therapeutic action of ephedrine in spite of its disadvantages.
- 6 were unaffected by pseudo-ephedrine, either favourably or unfavourably.
- 7 experienced unpleasant side actions, and did not get the same relief of their asthma as with ephedrine.

These results were disappointing, for it had been hoped that pseudo-ephedrine might be a valuable substitute for ephedrine in patients who had experienced the unpleasant side actions of ephedrine. Of the 21

patients in whom ephedrine had produced mild or severe side actions or had failed to give relief, only 4 preferred the action of pseudo-ephedrine. And of 6 patients, who were completely intolerant of ephedrine, only 1 was relieved by pseudo-ephedrine. The test to which pseudo-ephedrine was submitted in this experiment was severe, for the patients were selected by the criterion that they had experienced unpleasant reactions with ephedrine. Pseudo-ephedrine was therefore prescribed to a second group of 10 cases, of whom 7 had not previously used ephedrine or pseudo-ephedrine, and 3 had been relieved by ephedrine without reactions. The results in these 10 cases were as follows:—

- 4 were relieved without reaction.
- 2 were slightly relieved without reaction.
- 2 were entirely unaffected by pseudo-ephedrine.
- 2 were not relieved and experienced unpleasant reactions.

The number of our cases is too small for percentages to have any great significance, but it would appear that ephedrine gives relief in about 85 per cent of adult asthmatics and unpleasant reactions in 50 per cent; pseudo-ephedrine gives relief in about 60 per cent of adult asthmatics and unpleasant reactions in 20 per cent. The therapeutic efficiency of these drugs is rather closely correlated with their toxicity but in a few patients pseudo-ephedrine will relieve the asthmatic paroxysms when ephedrine has had to be abandoned on account of its unpleasant side actions.

CONCLUSIONS

- (1) Pseudo-ephedrine given by the mouth was more efficacious than ephedrine in lessening the frequency of attacks of asthma in children.
- (2) Pseudo-ephedrine was less efficacious than ephedrine in relieving the actual asthmatic paroxysm in adults.
- (3) Pseudo-ephedrine is less toxic than ephedrine, but in large doses it may produce the same unpleasant side actions.
- (4) Pseudo-ephedrine is worthy of further trial in the treatment of asthma in childhood, and in the treatment of adults who are unable to tolerate ephedrine.
- (5) Neither ephedrine nor pseudo-ephedrine is as effective as injections of adrenaline in the treatment of the asthmatic attack.

The Treatment of Profuse Bleeding from the Stomach and Duodenum

By R. S. AITKEN, M.B.N.Z., D.Phil. (Oxon.),
M.R.C.P. (Lond.)

(Abstracted from the *Lancet*, Vol. I, 21st April, 1934, p. 839)

THERE is no general agreement about the principles on which cases of profuse bleeding from the stomach and duodenum may best be treated. This is unfortunate, because severe cases, where the bleeding is grave enough to threaten life, often come under the care of hospital residents and practitioners whose individual experience of the emergency is not great. The main choice lies among three courses of action: purely medical treatment, medical treatment plus blood transfusion, and surgical treatment. The conservative teaching recommends medical treatment only, and in the absence of an extended experience of other methods the wise course is clearly to follow that teaching. It is usually coupled with the comforting assurance that very few cases so treated die. It is doubtful, however, whether the fatal cases are in fact few enough to offer much comfort, when it is remembered how common profuse bleeding is. Published figures vary from Hurst's 2½ per cent mortality among cases admitted to Guy's Hospital on account of hæmatemesis or melæna and not previously operated on, to Chiesman's 25 per cent mortality among cases admitted to St. Thomas's Hospital for gross hæmatemesis and melæna. Statistics on this subject are particularly difficult to appraise, because no exact limit can be set

to the degree and recency of bleeding that justifies admission of a case to a series, and because statistics take scant account of the very variable circumstances and features of different cases. Nevertheless, it does seem clear that approximately 10 per cent, at least of the moderately severe cases, die. This is no negligible minority. Hæmatemesis and melaena are so common that fatalities represent a considerable number of lives, and it is no credit to modern medicine that these are still lost from a cause so clearly understood and—in theory—so easily remedied as hæmorrhage from the stomach or duodenum.

The best use of the three methods mentioned above (medical treatment, transfusion, surgical treatment) is clearly to be found only by experience, for none is infallible, and each has its dangers. Bare statistics are an unreliable substitute for experience. On the other hand few observers, if any, have had adequate experience of all three methods, and if they have none has published an appraisal of them that has won widespread assent. The problem can best be studied, then, by collating the experience of a number of observers using these methods. This I have attempted to do, using the records of the London Hospital, which are in most cases sufficiently full for the course and the severity of the cases to be fairly accurately judged. The records chosen were examined from the point of view of estimating the value of medical treatment, transfusion, and surgical treatment, in dealing with uncomplicated urgent bleeding of the stomach and duodenum.

CASES TREATED MEDICALLY

There were 31 cases, with 17 deaths. The medical treatment consisted fundamentally in complete rest in bed, morphia, and by mouth either nothing at all or minimal quantities of water or ice. Some patients also received adrenaline or calcium lactate by mouth, saline solution rectally or hæmoplastin subcutaneously.

CASES TREATED MEDICALLY WITH THE ADDITION OF BLOOD TRANSFUSION

In this group there were 11 cases, with 3 deaths. The ages were from 15 to 64 (average 41). The sources of bleeding (judged usually from clinical evidence or subsequent x-ray examination) were: chronic gastric ulcer in 3 cases, chronic duodenal ulcer in 4, chronic jejunal ulcer in 1, acute ulceration in 2, and carcinoma of the stomach in 1 (non-fatal).

CASES TREATED SURGICALLY

There were 21 cases, with 7 deaths. The ages ranged from 24 to 62 (average 45). In all of them operation was undertaken with the object of *stopping bleeding*. The patients, many of whom had been referred by physicians, were all gravely ill from loss of blood, with the exception of the first two, in whom the bleeding was apparently somewhat less severe and transfusion was not given.

DISCUSSION

For the reasons mentioned in the introduction no valid statistical conclusions can be drawn from these case and mortality records. They do, however, broaden the outlook of anyone who has had some experience of similar cases. The attempted separation into less severe cases and grave cases throws into relief the fact that a large proportion of the latter (27 out of 63) died. Though the line of separation is not a hard-and-fast one, yet it is nearly always possible to say clinically whether a given case is grave or not. It is therefore well to know that 3 out of every 7 grave cases are likely to be fatal. This is obscured by the common method of expressing the mortality rate as a percentage of all cases. Whether the figure, 3 out of 7, obtained from this series holds exactly for other series does not affect the argument. Since this series has a general mortality rate of 11 per cent, it is probably a fairly typical series and justifies the inference that something between one-fourth and one-half of grave cases of gastric and duodenal bleeding end fatally.

There is no means of predicting with any accuracy which grave cases will die. Under purely medical treatment some go apparently very near to death and then recover; others die unexpectedly, or develop unforeseen respiratory or mental complications which turn the balance against them. Patients with a dyspeptic history suggesting chronic ulcer, and patients who have not had dyspepsia, as well as malignant cases, are found both among the recoveries and among the deaths. Any attempt therefore at further subdivision of grave cases with a view to individual prognosis seems useless.

It remains simply to review methods of treatment and to attempt to assess them empirically. In this series the mortality was heaviest among the cases treated medically; this remains true when the malignant cases and those at the extremes of age are excluded, and it definitely lays the conservative teaching of medical treatment in *all* circumstances open to criticism. The results of a surgical attempt to deal directly with the bleeding point, in a group of cases of similar severity, appear slightly better; they show at least that, in expert hands, operation on these exsanguinated patients is not necessarily a sentence of death. The middle group of cases, treated medically with the addition of one or more blood transfusions, deserves closer consideration. It showed—for what it may be worth—a lower mortality than the other two groups; and of its three fatal cases, one was already mentally deranged and another was moribund when the transfusion was given. Eight cases, however, were transfused while still bleeding, or shortly after the cessation of bleeding, and they recovered. This sets the evidence of experience against the theatrical view that transfusion, by raising the blood pressure, will merely increase the loss of blood from the bleeding vessel or vessels, and in that respect is in line with the experience of those who treated secondary hæmorrhage in war wounds by transfusion.

From a review of the whole series of cases studied in this paper the following recommendations emerge for the management of gastric and duodenal bleeding (hæmatemesis and gross melaena):—

(1) A distinction should be made, clinically, between grave cases and less severe ones. Recurrent bleeding is often but not always grave. Cases in which the red cells fall below 2,000,000 or the hæmoglobin below 40 per cent (on a scale on which the normal is 100 per cent) will usually be grave. The distinction is to be made, however, on consideration of the whole clinical picture.

(2) The less severe cases should be treated on the accepted medical lines.

(3) The grave cases should be treated medically, in bed, with sufficient morphia to ensure complete rest; and a transfusion of about 500 c.cm. of blood should be given, without moving the patient from his bed, after careful cross-grouping.

(4) If further bleeding is indicated by subsequent hæmatemesis or rising pulse rate, the transfusion should be repeated once or twice within the next 24 to 48 hours, or when necessary.

(5) If bleeding still continues and the patient's condition deteriorates, operation should be promptly undertaken, along with a further transfusion. The operation should probably be restricted to the minimum procedure necessary to find and secure the bleeding point.

These recommendations are substantially the same as those given by Hurst in his book on *Gastric and Duodenal Ulcer* in 1929. Bastedo in America and Tzanek in France agree in advocating transfusion in addition to medical treatment for grave cases, and in reserving surgery for those few cases in which the bleeding continues in spite of repeated transfusion. This course does not appear to have been widely practised in this country; it was not considered by any of the four opening speakers in a recent discussion on the

treatment of hematemesis in the sections of medicine and surgery of the Royal Society of Medicine.

The Modern Approach to the Problem of Human Sterility

By SAMUEL R. MEAKER, B.A., M.D., M.R.C.S.,
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(From the *Practitioner*, Vol. CXXXII, March 1934,
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AMONG human beings the sex life is frequently unhygienic, 12 per cent or more of matings prove to be barren, 20 to 25 per cent of conceptions result in miscarriage, other abnormalities of pregnancy are common, childbirth borders upon the pathological, and the function of lactation is notoriously imperfect. It would be interesting to know how this unenviable record of reproductive achievement compares with the record of primitive humanity living under conditions less artificial than those of modern civilization. Certainly it compares ill with the average record of lower animals. Williams, writing on sex hygiene and reproduction in cattle, says, 'When a sexually sound cow, properly in heat, is bred to a genitally sound bull, she surely becomes pregnant'. Every one knows that such physiological perfection of the reproductive mechanism does not prevail in the human race.

If 100 human couples, young and apparently healthy, marry and have regular intercourse without contraception the results may be predicted with fair accuracy. In a small minority of cases pregnancy will occur at once, the wife missing her first period. Most of the wives will conceive after intervals ranging from a month to a year. Some few will have a first baby one to several years after marriage. A dozen couples of the hundred will remain permanently childless. Thus nearly 90 matings sooner or later prove conclusively that they are not barren, but at the same time they show the most obvious differences in the grade or degree of their fertility. Again one is led to conclude that, in relation to a standard of absolute perfection, the majority of human beings must be rated as more or less infertile.

This conclusion is further supported by direct clinical observations. To-day one recognizes a large number of disorders, some genital and some constitutional, which may operate to depress the reproductive function. If clinically fertile couples be subjected to a complete diagnostic study, the result is usually that one or two of these factors of infertility are discovered. In other words, there is objective evidence to demonstrate the fact that most non-sterile people possess a grade of fertility which is relative only, in the sense that it falls short of absolute perfection.

CAUSATION OF STERILITY

If the same methods of investigation be applied to clinically sterile couples, the principal difference in findings is one of degree. Each case shows, not one or two factors of infertility, but between two and nine, the average in my clinic being 4.86 factors per case. Thus it appears that, while Nature unaided often overcomes one or two obstacles to conception, four or five such obstacles commonly impose a barrier which she is unable to surmount. It is, of course, possible for sterility to be caused directly by one abnormal condition. Either a complete failure of spermatogenesis or of oogenesis, or a complete blockade in the male or female genital passages, is sufficient by itself to render absolutely sterile an individual, and hence any mating into which that individual may enter. Such absolute causes occur in about 30 per cent of clinical cases of sterility. Even then there are nearly always other causative factors in the background, which would become operative if the absolute causes were removed. In the remaining 70 per cent of cases the sterility is due not primarily to a single abnormality,

but to a summation or totality of multiple causative factors, of which any one alone might be of small importance. Moreover, these multiple factors are but seldom limited to one or the other partner. In my cases, some evidence of infertility has been identified in more than 90 per cent of the husbands and more than 95 per cent of the wives. The ordinary clinical problem, therefore, is not that of a definitely fertile man mated with a unequivocally sterile woman or *vice versa*.

It is rather the problem of two individuals, each possessing a somewhat lowered fertility, who together contribute a sufficient sum-total of factors to depress the fertility level of their mating below the threshold of conception.

In the past ten years one has learned to appreciate, with greater accuracy than ever before, the various factors which conduce to human infertility. A brief summary of these will here suffice. Local genital factors in the male play, altogether, a comparatively small part. The more serious disorders, such as testicular atrophy and epididymal blockade, are not common; while the pathological conditions more frequently encountered, such as varicocele and chronic prostatic-vesiculitis, seem to exert only a mildly depressing influence. Relative deficiencies in the semen are the rule rather than the exception among male partners to sterile matings; but the explanation of these subnormalities is to be found in states of constitutional depression far more often than in local disorders of the genital organs.

Local genital factors in the female are numerous and important. Rarities being excluded, there remain four groups of gynecological conditions which contribute frequently and notably to infertility. These are female genital hypoplasia, viscosity of the endocervical mucus, tubal obstruction or occlusion, and mechanical impediments to ovulation.

Constitutional factors influence the fertility of both sexes to an extent which medical men have only recently come to understand, though stockbreeders have long realized the importance of such conditions. Among human beings the reproductive capacity may be diminished by endocrinopathic states, chiefly those involving the anterior pituitary lobe or the thyroid; by any type of chronic intoxication, in particular that resulting from focal infections; by insufficient protein or other faults in the diet, together with a lack of enough exercise to insure good assimilation; and by a debility of whatever nature, especially the otherwise unimportant depression caused by slighter grades of anæmia.

Since the idea of constitutional factors causing human infertility is comparatively new, one might do well to cite briefly the principal evidences upon which it is based. First, there is the practical experience of the poultry yard and of the stock farm, in addition to the experimental work of the biological laboratory. While some caution must be exercised in applying to human beings conclusions drawn from the reproductive performance of lower animals, it nevertheless seems clear that subnormal constitutional states are likely to induce a deficient grade of gametogenesis in the genus homo, as well as in the other genera. Second, human patients who suffer from the constitutional conditions mentioned above, almost invariably show a lowered basal metabolic rate and other objective indications of depressed vital functions; and these measurements tend to become normal as soon as the underlying fault is corrected. Third, in male patients of this type the semen, when quantitatively evaluated according to standards of number, morphology, motility, and endurance of the spermatozoa, commonly proves to be deficient, but is seen to improve steadily under constitutional treatment. Fourth, the elimination of constitutional faults from one or both partners has now resulted in the clinical cure of sterility in cases so numerous that any likelihood of pure coincidence may be disregarded.

DIAGNOSTIC STUDY OF STERILITY

From the foregoing remarks upon the causation of human infertility it becomes evident that adequate diagnostic study of the sterile mating is necessarily a complex procedure. It must deal with the husband no less than with the wife, and must take into account the constitutional condition as well as the state of the reproductive organs. By tradition, the problem of sterility has been assigned to the gynaecologist. Actually it belongs in nearly equal degree to the urologist, the internist and the endocrinologist.

The essential feature of such an investigation is its completeness, in the sense that every possibility is routinely surveyed. Thus, and only thus, can one say in each case not only that certain causative factors are present, but also, and with equal assurance, that all other demonstrable factors are absent. In the past it was the fashion to accept the first discovered abnormality as the sole and only cause of sterility in any particular mating, the normality of all other items being most unwarrantably taken for granted. Such incomplete diagnostic study led to incomplete treatment, of which the results were, in general, notoriously unsatisfactory.

The gynaecological investigation of sterility should include history, abdomino-pelvic examination, measurement of the uterine index, trans-uterine insufflation of gas, hystero-salpingography, study of the endocervical secretions, and post-coital examination of the vaginal and endocervical contents. Some of these tests may require to be repeated before final conclusions are reached.

The urologist takes a history, makes a thorough examination of the male genital organs, and studies the prostatic-vestibular strippings. It is also his duty to examine the semen according to exceedingly critical standards, with a mathematical rating of the spermatozoa as to their number, morphology, motility, and endurance. The resultant figures may be accepted, broadly speaking, as a quantitative index of male fertility. If a specimen of semen is rated at less than 70 per cent of the normal, there is evidence of relative infertility on the part of the male. A specimen evaluated as low as 40 per cent indicates for practical purposes, complete sterility, since the same factors which cause the obvious depression usually operate to reduce, in a less obvious way, the fertilizing power of such spermatozoa as are present.

The medical histories and general physical examinations of husband and wife are expected to identify, first, any departures from the accepted standards of good general health and hygiene and, second, those special items which are known to have a direct influence upon fertility. Among these latter are included errors of diet, insufficient exercise, faulty hygiene, focal infections, other sources of chronic intoxication, diseases of the blood, and other debilitating conditions of whatever sort.

The endocrinologist must carry out an investigation of both partners sufficiently elaborate to diagnose even the milder grades of endocrine disturbance, and in particular the sub-functional states of anterior pituitary, thyroid, and ovary. The past ten years have brought many advances in the field of endocrinology, particularly along lines of biological experimentation. This work is basic research of the highest order, and without doubt the foundation of much future progress. It has already yielded practical results in the treatment of certain menstrual disorders, but as yet it has not contributed notably to the clinical management of infertility. At present, the endocrine aspect of sterility cases is still best evaluated by a discriminating use of the older methods. These include history, physical examination, physical measurements, determinations of oxygen, carbohydrate, and nitrogen metabolic rates, examination of urine and of blood, and in certain cases, other special tests. When each of the individual workers has completed his part of a sterility investigation, the final step is a correlation by conference, of

all the data obtained. Thus each problem is reduced to its simplest terms, a certain number of definite factors, and the way of treatment is clearly indicated.

TREATMENT OF STERILITY

The ideal treatment of the sterile mating would remove all obstacles to conception, thus bringing about a condition of perfect or absolute fertility. Actually, this can seldom be accomplished. The practical aim of treatment is to remove a sufficient part of the sum-total of depressing factors so that the fertility level of the mating may rise above the threshold of conception. This practical result is attained with a degree of ease which varies widely in different cases, according to the number and character of causative factors present. In some instances sterility can be cured by the simplest treatment; indeed, spontaneous cures are not uncommon, since there is constantly more or less fluctuation in levels of fertility. Matings relatively less fertile require more complicated procedures, while in those of lowest fertility all treatment may be unavailing.

In the ordinary clinical case, in which four or five factors are operative, the removal of any two or three of them may be sufficient to raise the fertility level into the range where conception becomes possible. Hence it is understandable that a given sterility might be clinically cured by any one of half a dozen different therapeutic programmes. For the same reason it is clear that any single item of rational treatment, however incomplete, will result in a certain number of cures.

In actual practice one naturally wishes to obtain the greatest number of successful results, and to do so in the shortest possible time. For that reason treatment should always be as nearly complete as possible. That is to say, it should be directed in each case against all of the causative factors which have been demonstrated, in order that the inhibiting sum-total may be broken down simultaneously on several different sides.

Medical treatment and endocrinological treatment are of the highest importance; indeed, their introduction has been mainly responsible for the great improvement in clinical results obtained in the past few years. Urological treatment should be carried out as indicated. I shall not attempt to discuss the details of these methods, since they come within the fields of my associates rather than within my own, but shall limit myself rather to certain observations on modern gynaecological treatment.

Female genital hypoplasia, as seen in the adult woman, is not directly amenable to treatment. After the age of 20 the developmental urge is dead, and ordinarily it cannot be revived. There seems to be a possibility that further advances in endocrinology may provide a means of dealing with this item, inasmuch as hormonal substances have already been found to stimulate follicular activity in the exceedingly immature ovaries of young animals.

Viscosity of the endocervical mucus can seldom be permanently corrected unless the os externum is large enough to allow free drainage. In cases of so-called pin-hole os, it is usually necessary to do a small dissection operation, since dilatation is inadequate and stems are dangerous. When the os externum is properly open, a course of depletion by glycerine or by heat will often rectify the abnormal condition of the mucus. If the viscosity has a background of infection, the quickest relief is obtained by the use of the cautery, or by removal of the diseased mucous membrane with the high-frequency electric current.

Tubal obstructions require as preliminary treatment that all necessary attention be given to chronic passive congestion and to chronic inflammation of the pelvic organs. Retro-displacements of the uterus should be corrected by manipulation and pessary. In many cases these simple measures alone are sufficient to restore tubal patency. For the more resistant obstructions, there are two possible lines of procedure. One of them

is the repeated therapeutic insufflation of gas and injection of oil, and excellent results are often thus obtained. The other method of treatment involves surgical operation. Salpingostomy is of relative little value except in fimbriated-cud occlusion; but in such cases it may be tried with considerable hope of success, especially if the operation be followed by therapeutic insufflation and injection for the purpose of maintaining patency.

Retention cysts in the ovaries and persistent corpora lutea are minor pathological entities of little or no general importance. In relation to sterility, however, they become items of the first magnitude, since they create an abnormally high intra-ovarian tension which interferes in a mechanical way with the maturation and rupture of normal follicles. Impediments of this type may be removed by careful ovarian surgery, of which a feature is the maximum possible conservation of normal tissue.

It has been suggested by friendly critics that my associates and I use methods which are unnecessarily elaborate. To these objections I would offer only one reply. Prior to 1927, working single-handed, I was able to obtain successful results in about 20 per cent of my sterility cases. The latest analysis of the results of our organized clinic, covering the years 1927-1931, shows that living babies have been born to 47 per cent of the couples who were investigated and treated according to present methods.

The cure, however, of established sterility will always remain a project less hopeful than prevention. There are five important items of preventive treatment; the greatest care should be given to the health and hygiene of adolescent children, particularly girls, with a view to forestalling genital hypoplasia. Faults of sex hygiene require attention, since they may lead to congestion of the female pelvic organs and so ultimately to cystic changes in the ovaries. Every effort should be made to eradicate venereal disease. It is important to avoid all unnecessary and harmful treatment of sterility, notably curettage of the endometrium, badly done plastic operations on the cervix, and operations for harmless retro-displacement of the uterus. Finally, childless couples should be encouraged to seek help without prolonged delay, since in any case some waning of inherent fertility begins during the fourth decade of life.

Backache

By V. B. GREEN-ARMYTAGE, M.D., F.R.C.P., F.C.O.O.
(Abstracted from the *Medical World*, 1st December, 1933)

It is not my intention to deal with gross lesions which cause backache, such as neoplasms or retroversion of the uterus with fixation, or of tubo-ovarian masses which may result from inflammation; I shall take, rather, those conditions which, as a rule, defy routine examination, the type of case which drifts from one doctor to another, or possibly finds its way to a quack, and eventually, no better but rather the worse, is wrongly labelled 'neurasthenia'.

Women, from a gynaecological point of view, may be divided into two great classes: the hypotonic, and the hypertonic. The hypotonic is the asthenic, and these form 30 per cent of all cases in gynaecological practice.

What are they like to look at? How can you 'spot' them in your consulting room? Usually, the face is long and mournful, they are flat-chested, the back is round, the scapulae project. The ribs are at an acute angle to the spine, and the abdomen below the umbilicus protrudes. As a rule these women suffer from dysmenorrhœa. They may live long, and intellectually are above the average. Those of them who become mothers frequently develop prolapse after their first baby, and those who are fortunate enough not to marry are generally to be found with various hypoplasias of the vagina and uterus and ovary, also with

high-arched palates, maybe spina bifida occulta, and maybe congenital prolapse.

The hypotonics are the women who drift from your practice, many of them seek consultants and are dilated here and stitched up there. Some undergo every type of pelvic engineering to cure them of their troubles. But the symptom of backache continues, for it is not of the pelvis, it is connected with the statics of the patient.

The line of gravity of the normal human being runs from the mastoid process directly down to the anterior junction of the cervical and dorsal spine, then in front of this junction it intersects the lumbar sacral articulation, midway between the sacro-iliac joints, to pass down just behind the head of the femur; it then cuts through the femur to run down in front of the knee joint, and reach the ground in front of the head of the astragalus. But in the kind of women of whom I am speaking the line of gravity is a different matter; it cuts the spine high up, above the dorso-cervical junction, giving the rounded back. It then passes behind the bodies of the lumbar vertebrae and behind the head of the femur. The result is that these women suffer from various morbid conditions of the spine, and the one that is most easy to detect is a marked lordosis or maybe scoliosis.

The normal person's erect position is maintained by the autonomic system, and that postural equilibrium is maintained by that system preventing the ligaments and muscles of the spinal column from getting tired. But if we sustain strain or become fatigued, or some accident occurs, then the autonomic system is put out of gear, and now postural equilibrium has to be maintained by the voluntary muscle system, and when that system tires, pain in the back ensues.

These asthenics or hypotonics either have some inborn abnormality, or they develop such, as a result of bad postures they are allowed to assume while at school, for naturally their mistresses do not understand the physics and biochemistry of the young girl nearing or achieving puberty. What are the effects of bad posture? or what may be causes of backache and the symptoms which these women suffer?

Backache in these people may be due to fusion of the transverse processes, or of one transverse process of the fifth lumbar vertebra to the sacrum. Sometimes the transverse process may be fused to the ilium. In other cases there may be hypertrophy and periostitis on one side; in another case bursæ may form and these inflame; in another there may be rotation of the sacrum, which can only be detected by a stereoscopic x-ray photograph. There may be a rotation of the fifth lumbar vertebra on its facets, or there may be a sinking of the fifth lumbar vertebra or sacrum. The pubic or ilio-sacral joints may show morbid changes.

But there are still other important changes, and they are the ones which occur in the main buffer or inter-articular disc, between the fifth lumbar vertebra and the first sacral. When a woman assumes the wrong posture and has obvious lordosis, or maybe scoliosis, what happens is that the buffers between the vertebrae become compressed to start with, and then, as a result of that pressure, they become thinned, and because the vertebrae are pushed downwards and forwards in the endeavour to maintain equilibrium, the discs tend to slide out between the bones, and the radiologist will tell you there is a lipping of the discs (most frequently the fifth), and these lips become perhaps ossified and press on the nerves which come out of the foramina of the lumbar vertebrae.

Another condition is that as a result of a descent of the vertebrae there may be an alteration in their 'facetting'. Any of these changes may occur in the women of whom I speak, who suffer from backache and have escaped diagnosis because a proper routine examination has not been carried out.

To do this the first necessity is, in the presence of a relative or nurse, to strip the patient and make her stand laterally, then look at her carefully from in front

and behind, noting how she stands, so getting to know how her line of normal gravity runs; and whether there is lordosis or scoliosis. Next, look for any rigidity or muscle spasm in the back while the patient is carrying out certain movements. With her hands on her hips, ask her to bend her body from side to side and backwards. Then find, if possible, the exact site of any acute pain she may feel. For instance, if you put your finger on the site of an inflamed bursa or periostitis, or a 'caught' nerve between the fifth lumbar transverse process and the wing of the ilium, she will have acute pain.

Next, carry out certain tests. First, get the patient to assume the knee-elbow posture, then ask her to hollow her back, then to arch it. With four fingers on either side of the vertebral column while she does this you will be able to tell whether there is localized rigidity or pain, which may place the origin of the backache, high up or low down.

The second test, known as Goldthwaite's test, is equally easy. Ask her to put one thigh and leg completely over the edge of the couch, keeping the other leg meanwhile straight out, then flex up the thigh which is on the couch, so causing rotation of the pelvis. If there is trouble in the sacro-iliac joint or symphysis she will have pain. This can be done in your surgery or a consulting room. Then put her other thigh and leg over the edge of the couch and test the other side. This will tell you whether the joint is inflamed, whether she has spondylitis or nerve involvement in its neighbourhood.

The third test is to put your hand under the back, and move the patient's thigh and leg upwards, to see if you can localize pain either in a high vertebra, e.g., in the third, or fourth, or in the pelvic joints.

Next, test the patient's knee jerks, because if she has developed some neuritis, or possible pressure which is causing destruction of nerve, there will be an alteration of the knee jerks, with probable obvious wasting.

Next have three stereoscopic x-ray photographs taken. An ordinary antero-posterior x-ray is not worth the celluloid on which it is rendered; it must be stereoscopic.

Having carried out the examination in this way and arrived at a tentative diagnosis, the next thing, and a very important one, is treatment. If you have a young girl who is at school, or who shortly after puberty has begun life as a stenographer or shop assistant, and has pain in the back, you will advise her on the following lines:—

First, there are the ordinary hygienic measures, which we need not waste time upon. Secondly, diet. These women are often very anæmic, with poor tone, and have acalcæmia: a shortage of vitamins A, B and D since they were born. Hence your aim should be to make good that shortage.

Next, you need to give the patient encouragement; please do not forget that; indeed your very thorough examination will help and impress her. Do not say, 'This is a bad business, but we must do our best'. Encourage her to do certain exercises herself, and put her into the hands of somebody who is capable of doing the proper manipulative massage and expert exercises.

Then we come to the subject of belts. I hate the word, because it spells something surgical, but it need not. You should be able to get corsets which will help these girls, in 99 per cent of the cases. These corsets should be so made that they lace from below upwards; many women are in the habit of wearing corsets which lace the other way. When they lace upwards they support the abdomen, which tends to protrude below the umbilicus. Such measures will cure over 90 per cent of your early cases, and no gynæcological operation will be necessary. But in a few cases you will need to provide plaster of Paris, or metal braces, or adhesive strapping, to assist in the immobilization of the structures in the neighbourhood of the fifth lumbar vertebra.

Having spoken of the chief extra-pelvic causes of backache in women, I will now refer to some intra-pelvic ones. The first of these is what I like to call 'pelvic flat-foot'. What is my reason for giving it that name? Some of you may have joined up for the war and, as recruits, had to march long distances. Your feet soon gave out, because you developed flat-foot. Nurses, policemen, and others who stand a great deal, are very apt to develop flat-foot, because the ligaments and muscles of the arch of the foot give way, and pain is caused in the back of the leg and foot. There is the same cause of pain in pelvic flat-foot. Such women have pain in the back because the muscles and ligamentous fasciæ of the pelvic diaphragm relax; they are, as a rule, anæmic multiparæ, but it may be met with in a woman who has had one large child or in one of the hypotonic type who has congenital weakness of the pelvic diaphragm and some prolapse. These cases may need operation, but at first rest, diet, and the ordinary hygienic treatment, associated with muscle atrophy, together with pelvic exercises, such as those of Stacey Wilson, will do more good. To operate without observance of these principles is to court failure.

But there is another condition, to which I give the name 'menopausal flat-foot'. When women are approaching the menopausal period of life they usually put on a good deal of fat around the waist, and suffer from fatty degeneration and wasting of the pelvic muscles and fasciæ. They do not complain of pain or backache until they reach the 'change of life'. Then they suffer from ovarian dysfunction, and, as a rule, from acalcæmia. What they need is the treatment of those who are hypotonic, together with small doses of thyroid gland and iodine.

The next big group we will speak of is the 'pelvic tonsil' group. What do I mean by that term? You who have had tonsillitis will know that it is accompanied by enlarged glands in the neck, which hurt when you turn your head or swallow. The 'tonsil' of the pelvis is the cervix, and when the cervix is inflamed, or torn, or lacerated, or may be is acutely infected with *B. coli* or gonococci, it is the same to the pelvis as the tonsil is to the throat: i.e., the lymphatics and glands are inflamed in the 'sacral bay', beneath the promontory of the sacrum. These glands may be inflamed with endocervicitis, just as they become involved in cancer. Therefore in the case of a woman complaining of backache always look with the speculum before you say there is nothing the matter with her. Endocervicitis is frequently a cause of pain in the back, just as tonsillar inflammation or enlargement causes pain in the neck. The treatment of each is identical.

Piles, constipation and varicose veins of the broad ligament go together: they are often merely a matter of cause and effect. A patient who is habitually constipated usually also has piles, and a patient with the latter often is constipated. The sigmoid colon runs on the left side of the pelvis, the left ovarian vein opens directly into the left renal vein and runs immediately under the sigmoid. Sir William Gull used to say, 'Every woman has a pound and a half of fæces in her sigmoid colon'. So remember that in the cases we are considering, this mass may press on the ovarian vein, and partially dam back the blood on the left side of the ovary and broad ligament and so produce varicosity of that ligament. Your patient may be a woman who does not take much interest in the action of her bowels or may be she is working all day cooped over a machine, and so this condition of varicosity of the pampiniform plexus of the broad ligament with tenderness and engorgement of the left ovary comes about.

The pain is referred to the back and the patient drifts from doctor to doctor. Often these cases are not diagnosed, because when the surgeon opens the abdomen the patient is in the Trendelenburg posture, and then one cannot see the varicose veins in the broad ligament.

How do you diagnose this condition? You can only diagnose it when the patient's pelvis is lowered into the normal position.

The next condition is the tension cyst of the ovary. These cysts in the ovary may defeat all attempts at diagnosis, even by the expert; the cysts may be scarcely larger than a walnut; they may be adherent; they may be prolapsed. These cysts may contain clear fluid, blood or chocolate-like material; one day they may be easily felt, the next seemingly they have disappeared. This illusive nature often causes argument. Because of the degree of tension in these cysts there is almost constant pain, though at times most severe between the menstrual periods. I think operation, together with removal of the appendix and ventro-suspension, is best for them if the pain is severe.

The next cause is in connection with the teeth, and flatulence and enteroptosis; they go together. Most of these women have heavy pouching below the umbilicus when they stand up. You should put a Curtis belt on to such a patient and get the bowels regularly open, make them do proper exercises, and eat and digest properly; have the attention of a good dentist, and then all their symptoms will probably disappear. This type of patient often has her appendix removed and œcum tucked up, but I doubt if they are benefited.

A Fourth Analytical Review of Reports from Pasteur Institutes on the Results of Anti-Rabies Treatment

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(Abstracted from the *Quarterly Bulletin of the Health Organization of the League of Nations*, December 1933, Vol. II, No. 4)

[WITH the decentralization of anti-rabic treatment in India, the duty of giving a prognosis is falling more and more on to practitioners. As many will not have the facts and figures at their disposal we are giving a summary of Colonel McKendrick's analytic review on this subject.]

SUMMARY

In the adjoining table, certain of the percentage mortalities are contrasted with those of the previous reviews:

	First review	Second review	Third review	Fourth review
All patients ..	0.49	0.48	0.23	0.48
(a) Live vaccines ..	0.27	0.26	0.21	0.26
(b) Killed vaccines ..	0.65	0.80	0.28	0.66
Europeans ..	0.17	0.13	0.10	0.14
(a) Live vaccines ..	0.20	0.11	0.13	0.15
(b) Dead vaccines ..	0.10	0.14	0.10	0.12
Non-Europeans ..	0.84	0.88	0.78	0.83
(a) Live vaccines ..	1.02	0.82	0.71	0.74
(b) Killed vaccines ..	0.83	0.89	0.93	0.85
Biting animal:—				
Dog ..	0.42	0.44	0.24	0.47
Cat ..	0	0.07	0.04	0.06
Wolf ..	18.31	0	5.52	7.3
Jackal ..	1.58	1.64	5.56	2.2
Category:—				
A ..	0.29	0.34	0.47	0.44
B ..	0.18	0.38	0.31	0.34
C ..	0.60	0.57	0.25	0.62
D ..	0.10	0.05	0.02	0.01
Deep bites ..	1.18	1.06	0.74	1.10
Superficial bites ..	0.12	0.24	0.09	0.18
On bare skin ..	0.66	0.62	0.38	0.66
Through clothing ..	0.10	0.13	0.04	0.12
Locality:—				
Head ..	2.85	2.42	1.24	3.17
Arm ..	0.40	0.49	0.25	0.35
Trunk ..	0.42	0.11	0.10	0.31
Leg ..	0.30	0.40	0.11	0.30

	First review	Second review	Third review	Fourth review
Delay in commencing treatment:—				
0 to 4 days ..	0.35	0.46	0.18	0.53
5 to 7 days ..	0.59	0.46	0.16	0.38
8 to 14 days ..	0.64	0.49	0.28	0.40
More than 14 days ..	1.04	0.69	0.33	0.73
Post-vaccinal paralysis ..	0.025	0.009	0.027	0.021
(a) Cords ..	0.22	0.019	0.048	0.025
(b) Dilutions ..	0.03	0.03	0	0.105
(c) Killed phenol ..	0.006	0.003	0.026	0.008

It has been pointed out in previous reviews that, on account of the much greater risk run by the non-European as compared with the European, a high degree of heterogeneity exists in statistics in which the two race types are combined. In order to obviate this difficulty, it was suggested that the statistics of institutes which have to deal with the two race types should be submitted on separate schedules, one for each type. The response to this request has been gratifying and, as far as possible, the statistics of the two race types have been separately dealt with in the above analysis. The figures relating to non-Europeans are not as yet very large; but it is hoped that in future years, when this procedure of separation is universally adopted, results of greater precision than those given here will be obtained. The statistics of previous years have been re-examined, and such figures as relate to the two race types separately have been extracted. It has thus been possible to collect comprehensive figures from the series of four reviews, and to tabulate them. These combined figures form the data upon which the following conclusions are based.

Tables have been given which summarize the results obtained in the case of Europeans and in the case of non-Europeans, when the figures referring to each of the following fourteen factors are extracted from the whole data:

1. Categories A and B;
2. Category C;
3. Deep bites;
4. Superficial bites;
5. Bites on bare skin;
6. Bites through clothing;
7. Bites on head;
8. Bites on arm;
9. Bites on trunk;
10. Bites on leg;
11. Delay in arrival 0 to 4 days;
12. Delay in arrival 5 to 7 days;
13. Delay in arrival 8 to 14 days;
14. Delay in arrival more than 14 days.

The question is then asked whether, when one of these sub-groups is considered, there is any evidence of significant differences between the results of the various methods of treatment. It appears that there is no evidence of significant differences except in the case of deeply bitten Europeans, and deeply bitten non-Europeans ($P=0.029$ and 0.01 respectively). [The case of the sub-groups—Europeans bitten on the head and leg in which the P values are small (0.008 and 0.03 respectively)—has been discussed in section X, where it has been shown that it is not advisable to lay too much stress on these values.]

The evidence of heterogeneity in the deeply bitten is in accordance with the view that the definition of a 'deep bite' varies from institute to institute, and also with the view that, at some institutes, the proportion of excessively deep and extensive bites amongst those classified as deep bites is much higher than at other institutes.

If this be the full explanation of the heterogeneity amongst the deeply bitten, then, even in these large statistics, it has not been possible to detect any evidence which would indicate superiority of any particular method of treatment; and, further, no evidence has been found indicating that live vaccines are more

efficient immunizing agents than dead vaccines under the conditions of dosage, etc., in which they are employed in practice.

The mortality amongst non-Europeans is found to be 6.5 times as great as that amongst Europeans. This racial difference is *reduced* in the case of those who are bitten by animals which are certified to be rabid (i.e., those belonging to categories A or B); in the case of those who are deeply bitten; in the case of those bitten on the bare skin, and in the case of those bitten on the head. Thus, in general, the racial difference is reduced in the case of those who are presumably at a high degree of risk. The racial difference is *increased* in the case of those belonging to category C (for one reason because the non-European is better acquainted with rabies in animals than is the European); in the case of those bitten through clothing (presumably because the clothing of the European affords a better protection than does that of the non-European); in the case of those bitten on the leg (presumably because the legs of the European are more usually clothed than are those of the non-European); and in the case of those arriving late for treatment (possibly because the better educated European, if at risk, recognizes more fully the advantage of early arrival).

It would appear, then, no single one of the above-mentioned factors is sufficient in itself to account for the racial difference in mortality, but that they all participate in it. In fact, the results are in conformity with the view that, as compared with non-Europeans, the European populations who are treated are diluted with a much larger number of individuals who have not in reality been infected with rabies.

Evidence of the advantage of early arrival appears to emerge with definiteness from the non-European statistics, but not from the figures relating to Europeans. The ratios of the non-European to the European mortalities for the successive periods 0 to 4 days, 5 to 7 days, 8 to 14 days, more than 14 days are respectively 5.9, 6.0, 8.0, and 12.1. Thus, the relative mortality increases progressively with lateness of arrival. It would thus seem that the relatively greater risk to

which the non-European is exposed becomes progressively more marked in the case of those who delay in coming for treatment. The absence of evidence of the advantage of early arrival in the case of Europeans is difficult to understand. It has been pointed out that the influences which come into play are very complex, and depend upon a number of secondary factors. For instance, as mentioned above, the European who considered himself to be seriously at risk would take steps to ensure early arrival. Whatever be the explanation, it would seem that the influences at work obliterate evidence of the advantage of early arrival in the case of the European, whereas in the case of the non-European they do not. Of course, the alternative view might be advanced that the rise in mortality in the non-European statistics might itself be due to one of these secondary factors. For example, there would probably be a tendency for trivial bites occurring at a great distance from an institute to be neglected, but for deeper and more extensive bites to cause such concern that a long journey to an institute would appear advisable. This would result in a tendency for those arriving late to be more seriously at risk, and thus for the mortality amongst late arrivals to be higher. The evidence at present available does not seem to indicate that those who arrive late are more seriously bitten than those who come early.

Further light on this matter could only be obtained if more detailed information were available, so that the causes of late arrival at the different institutes and the relation of late arrival to severity of bite could be ascertained. The matter is important because, if a knowledge of the factors at work were available, an estimate might possibly be arrived at as to the absolute and not merely the relative efficiencies of the various methods of treatment.

From figures relating to 290,337 persons who were treated by the various methods, it appears that the liability to post-vaccinal paralysis amongst those treated by 'live' vaccines is 4.4 times as great as amongst those treated by 'killed' vaccines, and 11 times as great as amongst those treated by 'heated' vaccines.

Reviews

THE MEDICAL ANNUAL: A YEAR BOOK OF TREATMENT AND PRACTITIONER'S INDEX. Fifty-second year, 1934.—Edited by H. L. Tidy, M.A., M.D. (Oxon.), F.R.C.P., and A. R. Short, M.D., B.S., B.Sc., F.R.C.S. John Wright and Sons Ltd., Bristol. Pp. ciii plus 644, with 192 text illustrations and 69 plates, plain and coloured. Price, 20s.

THE arrival of the *Medical Annual* each year is a matter of no little importance to medical readers in this country, as it probably is to those in all other countries where the English language is the common medium of expression of scientific men. We will not say that this year it is 'bigger and better' than ever, because the remark is suggestive of a formula, though in actual fact it is larger by one *forme* and, if it is not better, it has certainly maintained the very high standard set by its fifty-one predecessors (the reviewer is speaking from personal experience of only nineteen of these).

Again, the year has not been remarkable for any outstanding advances, but there is abundant evidence in these pages that in none of its branches is medical science threatened with stagnation. However, in the space of the column allotted for this review, only the briefest reference can be made to a small percentage of the many subjects dealt with.

Further work with supra-renal cortical extract in the treatment of Addison's disease is reported, but this

hormone extract seems to be a long way from playing insulin to the diabetes of Addison's disease. Agranulocytic angina, a comparatively new disease, still continues to attract attention, but contrives to maintain its high mortality; pentose nucleotide K.G.96, intramuscularly administered, offers the best chance of relief. Some of our preconceived ideas regarding anæmia having been badly shaken a few years ago, the subject is undergoing complete reconstruction, so that few years pass without an 'authoritative' reclassification; some confusion is certain to be the result and we pity the medical student of the present day, but as there appears to be little acute divergence between different authorities, we assume that the matter will soon sort itself out. Anæmia, in its many aspects, is given a number of pages, which not only give one a good summary of the year's work on this important subject, but show clearly the modern trend; this is very definitely towards the effect of dietetic deficiencies in this condition. New premedicants and basal anæsthetics come into favour each year, though they do not always oust their predecessors; sodium soneryl, a barbiturate, but less toxic than many allied compounds, seems to be finding considerable favour. (This reminds us that we found no reference to the 'battle of the barbiturates' in these pages.) A successful method of artificial respiration, for employment on the operating table, the inflation of the lungs by blowing through the face-piece of an ether

inhaler, is described and illustrated. Blood transfusion still continues to be popular, but more particularly with the surgeon and the gynaecologist than with the physician; valuable hints on the technique of this operation are given. Interest in lymphogranuloma inguinale has been stimulated by the introduction of Frei's test and the publication of Stannus' book on the subject, but this is not sufficient justification for the subject being dealt with in two places, particularly as this appears to have been done at the expense of granuloma venereum, reference to which we could find under none of its common pseudonyms. The radium treatment of cancer is becoming a more important and a more complicated subject each year; it has long since ceased to be the last resort in inoperable cases, but it is being used more and more in early cases in combination with surgical removal of new growth. But we must go faster; though we have missed many important sections we are still in the C's and our space is nearly exhausted.

Surgeons will find many new operations and new methods of doing old operations described. They have been given the giant's share of the illustrations; these are all clear and make detailed descriptions of technique unnecessary.

Readers who have to treat tropical diseases have again been well served; this section has been done, as hitherto, by Sir Leonard Rogers. We hope that when he retires from active work his successor in office will replace him here. Under the amebiasis reference is made to carbasone (*sic*) treatment; the error is possibly a printing one, and it is the only one we noticed.

The editors will perhaps forgive us if we add the sauce of criticism to our review; the introduction, which is by way of being a summary of the book and for that reason very useful to the indolent reviewer, is not quite up to its usual standard; further, the taint of cynicism, so inappropriate here, has been allowed to creep in, *e.g.*, the paragraph on asthma.

The *Medical Annual* still maintains its very high standard and continues to be the best value for his money that the medical man, be he physician, surgeon or gynaecologist, general practitioner or specialist, can hope to get.

L. E. N.

PRINCIPLES OF GYNÆCOLOGY.—By W. Blair-Bell, B.S., M.D. (Lond.), F.R.C.S. (Eng.), F.C.O.G., F.A.C.S. (Hon.), LL.D. (Glas.). Fourth Edition. 1934. Baillière, Tindall and Cox, London. Pp. xiv plus 848, with 16 coloured plates and 507 figures. Price, 35s.

THIS is the fourth edition of this book of which the first appeared in 1910. It has been largely revised and rewritten by M. M. Datnow, of the University of Liverpool, and Arthur C. H. Bell, surgeon to the out-patient department, Chelsea Hospital for Women.

The work of revision has been very complete and several sections have been entirely re-organized. The book has been brought up to date by the inclusion of chapters on physiological phenomena (internal secretions) and pathological lesions (endometriomata and ovarian neoplasms). The portion on the nature and treatment of malignant disease, with which work the author is specially identified, has been almost completely rewritten. In the treatment of innocent neoplasms, a considerate attitude is recommended and it is advised to approach their treatment 'in a physiologically reverent and conservative spirit'. It is emphasized that 'the complete removal of both ovaries for neoplasms during the reproductive period is rarely necessary'. One is glad to find this point stressed in view of the spate of unnecessary surgical interference which has deluged this field of gynaecology in the past.

The author very modestly devotes a brief page and a half to the place of lead therapy in malignant disease. It is pointed out that local treatment of malignant lesions cannot fill the mark, and that some general systemic mode of attack is essential. He is of opinion

that a chemical preparation which has a specific action on the chorionic epithelium with its syncytium should exert the same lethal influence on the cancer cell.

He has shown that lead fills this rôle.

The method of administration is briefly outlined and also the use of H_{228} (lead salt of benzenesulphonylglycinate) and H_{213} (lead potassium complex of o-thiobenzoic acid).

A fuller account of the end results of treatment might have been included in this section.

Many new illustrations and some coloured plates have been added; these are excellently carried out and convey their meaning in the clearest form.

Part II, which comprises history taking and the examination of the patient, is very comprehensive and will be of considerable value to the student and the practitioner.

It is difficult to single out any case of omission in this excellent volume. The section on contraception is rather brief and contraceptive methods might have been more freely emphasized and more fully dealt with. The whole book bears the impress of the author's personality and this personal note is an added interest. The subject-matter in each section is very clearly expressed without redundancy and with all essentials fully discussed. The historical instruction is valuable and will act as an incentive to embryo practitioners to follow in the illustrious path of the great exponents of gynaecology. The question of where obstetrics ends and gynaecology begins is always a moot point and this book makes more than a successful attempt to solve this knotty problem. The radiographs reproduced are excellent. The illustrations in the section on operative procedures are lucid and the details are always well defined.

Appendix 1 gives a list of post-operative exercises and these are of special value, as references to the necessary sequelæ of treatment in other textbooks on gynaecology are very scanty.

Appendix 2 is devoted to the ætiological classification of the cause of certain gynaecological symptoms and manifestations, and forms a most convenient and compact arrangement of basic principles which should be of the utmost value to readers.

The publishers are to be congratulated on the general formation of the book which is free from printing errors and omissions.

The volume can be thoroughly recommended to the general practitioner and the student as an up-to-date, clear and concise treatise on gynaecology. It has few superiors, if any, in the domain of gynaecology amongst English textbooks. The section on evolution of the female genital organs in vertebrates is very excellent and a useful introduction to the general study of gynaecology. The book should be a most useful addition to the library of the practitioner and the senior medical student, and, at such a moderate price, should be accessible to all who are interested in this branch of the healing art.

D. M.

TREATMENT IN GENERAL PRACTICE.—By H. Beckman, M.D. Second Edition. 1934. W. B. Saunders Company, Philadelphia and London. Pp. 889. Price, 45s.

THIS is a well-arranged and eminently practical book. In his preface to the first edition the author described himself as an editor of the true authors of the book who are represented by the extensive bibliography which he gives. While accepting this definition of his functions, the reviewer feels that he must congratulate the author on his editorial capacity, for he has the faculty of selecting only essentials from the mass of literature he has consulted in the preparation of the book, and, where he does not directly quote from an authority, his own writing is clear and his facts are presented in an admirably condensed form. Another valuable character of the book is that it is remarkably up-to-date, considering the amount of ground covered,

for all the important advances well into the year 1933 are included.

There are a few errors in printing, for example in the top line on p. 108, 0.2 should be 1.2, but the author is probably not responsible for mistakes of this kind.

Written as it is by a pharmacologist, it is perhaps natural that drug treatment somewhat overshadows that of general management and diet, and the book might be improved if the latter aspects of treatment were somewhat enlarged upon.

On the whole the most modern opinions available on treatment are given fairly, and if the author at times is led to disagree with certain statements of his authorities he supports his contentions by urgent arguments drawn from his own wide experience of the action of drugs. It is a book that can be recommended equally to the beginner and to the experienced physician, for it can safely be taken as an authoritative guide by the former, and by the latter as a reference book in which he will find available the most up-to-date information on therapeutics.

P. A. M.

TREATMENT OF THE COMMONER DISEASES MET WITH BY THE GENERAL PRACTITIONER.—By Lowellys F. Barker, M.D. 1934. J. B. Lippincott Co., London and Philadelphia. Pp. vii plus 319. Obtainable from Messrs. Butterworth and Co. (India), Ltd., Calcutta. Price, Rs. 9-6

THIS book is based upon ten lectures delivered by Dr. Barker, Professor Emeritus of Medicine, Johns Hopkins University, to the Academy of Medicine of Lima and Allen Counties, Ohio. The book, as its title indicates, deals with the management of some of the internal diseases that are generally encountered by the physician in his general practice. In the preface the author says:—'Medical research has in recent years been making prodigious progress; original contributions to knowledge have been made in every diagnostic and therapeutic domain. Even in the great teaching centres, no single man any longer lays claim to complete acquaintance with the newer facts in all branches. Before the task of keeping pace with all of the advances of practical significance in connection with infectious diseases and with disorders of the respiratory, the circulatory, the hæmopoietic, the digestive, the urogenital, the locomotor, the nervous, the mental, the metabolic and the endocrine systems the most encyclopedic type of mind must falter'. The object of this book is, therefore, to present brief 'synopses of achievements' in the treatment of some of the commoner diseases in order to enable the busy practitioner to keep pace with progress made in medicine in recent years. This purpose has been fulfilled by Professor Barker in a very satisfactory manner. In this small but scholarly volume he has presented the 'whole welter of medical literature' in so condensed a form and in a delightfully readable manner. At the same time the information contained in the book will be found satisfying and instructive not only to the general practitioner, but also to a wide range of advanced research workers. The book is replete with references to the original authorities in practically every page, and the frequent references to the author's own long experience extending over forty years forms a valuable feature of the book.

In the ten chapters which comprise this book a very wide field is covered by the author. No attempt is made to discuss fully or completely the treatment of any particular disease, nor does the author deal with the ætiology or other aspects of the diseases. Chapter I contains some general considerations in the method of studying patients and is divided into the four groups, the pyknic, asthenic, athletic and dysplastic; chapter II deals with some of the commoner infectious diseases. The next two chapters are devoted to disorders of the respiratory and circulatory systems, and chapter V to commoner diseases of the blood and of the blood-building organs; chapters VI to VIII describe

some of the diseases of the digestive apparatus, kidney and urinary passages and the locomotor system. A short but interesting account of the commoner nervous and mental diseases is given in chapter IX, and in the concluding chapter an excellent survey of the diseases of the metabolism and the endocrine system is presented. The section of the principal vitamin deficiencies is up-to-date and contains references to the work of Szent-Györgyi on the isolation of vitamin C and other very recent work on the subject.

In a book of this character it is manifestly impossible to deal with all the 'ills that flesh is heir to'. But after reading the book one feels that the treatment of some of the commoner tropical diseases has received scant attention at the hands of the author. For instance, there is not a single reference in the book to leprosy, kala-azar, or filariasis. A section on the treatment of some of these major tropical diseases would be welcomed by physicians practising in these regions, and make the book more complete. It may be hoped that for the next edition of the book the author might consider this suggestion.

The book contains useful and practical information for the physicians and can be confidently recommended to them.

S. S. R.

THE BIOLOGY OF THE PROTOZOA.—By Professor G. N. Calkins, Ph.D., Sc.D. Second Edition. 1933. Ballière, Tindall and Cox, London. Pp. xii plus 607, with 3 colour plates and 223 figures. Price, 37s. 6d.

THIS book is a second edition of Professor Calkins' well-known work of 1926, and is a very great improvement on the first edition. The chapter on the 'Chlamydozoa' has disappeared, and these supposed organisms are only referred to once (on p. 360) as 'the questionable Chlamydozoa'. The other chapters have been rearranged, and a new one added on general ecology, commensalism and parasitism.

The book is not an easy one to review. In the first place it contains an amazing amount of information collected during almost a lifetime of study of the Protozoa, chiefly of the free-living forms, and especially of the Ciliata. The medical protozoologist is apt to take far too narrow a view of his subject, and to consider only such forms as are endoparasitic or entozoic in man. From this point of view the book should be read *in extenso* by all laboratory students of the parasitic protozoa of man, for its wide and comprehensive presentation of the biology and bionomics of the Protozoa. Such subjects are considered as reproduction, fertilization, sex differentiation, growth, vitality, maturity, senescence and organization. The medical reader of this book will glean here something of the general principles underlying the science of protozoology and of the organization and development of the Protozoa.

The arrangement of the book, however, is confusing, whilst the style is extremely scrappy and inadequate. No pages are given in it, only the date and volume references being given. The author appears to be very familiar with German, and, of course, American protozoology, but rather ignores the work done by British and French protozoologists. The chapters on taxonomy will be most useful to all students of the science. The English reader will shy at some of the nomenclature; such words as 'fiber', 'cecum', 'ameba', 'endameba', and 'skeptics' are annoying to anyone with a classical upbringing. Mr. Clifford Dobell is incorrectly referred to in the bibliography as C. C. Dobell. The bibliography gives only one reference to Sir Ronald Ross, this dealing with *Leishmania donovani*; and only two to Dr. Wenyon's work.

When one comes to the medical aspects of the book, frankly the reviewer is appalled. There are two colour plates of the malaria parasites; one is an absolute travesty of the beautiful and accurate originals in

Wenyon's *Protozoology*; the other, of the development of the gametocytes of *Plasmodium falciparum*, after Aragão, is not very much better, the erythrocytes showing a fine stippling which is not true to life. The accounts of leishmaniasis, malaria, and trypanosomiasis are brief, rather confused, and not too accurate. The section on amebiasis would be better deleted. On page 51 an organism, which is apparently *Entamoeba coli* in its motile, trophozoite phase is depicted and called '*Endamoeba intestinalis*'. This apparently refers to Aragão's attempt in 1917 to rename *Entamoeba coli* as *Endamoeba intestinivulgaris*, and later in the same year as *Endamoeba intestino-vulgaris*, both of which names Dobell has shown to be invalid. The parasite of amebic dysentery becomes *Endamoeba dysenteriae* to Professor Calkins, and is illustrated in a very poor plate after Cleveland and Sanders on p. 394, including a very atypical octonucleate cyst containing chromatoid bars. (If other authors are to be borrowed from, there is no excuse for ignoring the beautiful and accurate plates in *The Amœba living in Man*.) What the figure on page 62 (after Hartmann) represents, it is difficult to say; but it is alleged to show stages in the metamorphosis of the 'endosome' and 'endobasal body' in *Endamoeba dysenteriae*.

Some amazing statements are made. On page 361 it is alleged that Wenyon records the occurrence of *Trichomonas* from the toe-nails. The reviewer is fairly familiar with Dr. Wenyon's work, but he can find no such statement in any of Wenyon's publications. Reichenow (no reference given) is reported as stating that members of the genus *Giardia* 'are frequently present in great numbers in the blood'. On pages 112 and 113 one finds resurrected the binuclearity hypothesis of Schaudinn and Hartmann, which one hoped was dead. An amazing account of the parabasal apparatus of *Leptomonas ctenocephali* is given on page 119, after Lwoff.

The reviewer has read Professor Calkins' book with very great interest, with much appreciation, but with some irritation. Minchin's *Introduction to the Study of the Protozoa* was a classic for decades, but it is now completely out of date. There is a real need for a simple and clearly written book on the general biology and taxonomy of the Protozoa, as apart from the much narrower science of medical protozoology. Professor Calkins' book, however, is neither simple nor clearly written; it is often both confused and obscure. Even with its defects, however, it is a volume which every serious student of the Protozoa should read for its valuable wealth of information.

R. K.

DIETETICS FOR THE CLINICIAN.—By M. A. Bridges, B.S., M.D., F.A.C.P. 1933. Henry Kimpton, London. Pp. xvi plus 666. Price, 32s.

THE interest displayed in diet by the medical profession is subject to the usual law of 'cycles'; without tracing the history back very far, one can say that dietetics had reached the ebb stage during the last century and that there is every indication that the tide is now flowing strongly. This inflowing tide is bringing in the flotsam of the patent food advertisements, but at the same time some valuable jetsam that had been prematurely thrown overboard to make room for the scientific advances (bacteriology in particular) of the last century. Although the study of dietetics is as old as medicine itself, the recent advances in chemistry and biochemistry which have taken place during the time that this field of medical science has been lying fallow have introduced so much that is new that an entirely new literature is demanded. This demand is being supplied, but, as yet, the medical library is not rich in books on dietetics; this remark applies particularly to clinical dietetics, though we do not share the extreme pessimism of the writer of the book under review, regarding all other books on dietetics. However, this book does undoubtedly fill a want.

The introductory sections on the physiology and mechanics of digestion will usefully refresh the memory of the reader. Section III provides a very good essay on vitamins and gives a few facts regarding the vitamin needs of the organism and the vitamin content of certain foods, but it leaves a number of gaps.

In the next section are given diets of food articles, rich and poor, respectively, in various food constituents, e.g., foods rich in calcium, and foods with low calcium content. The value of these tables are limited by the fact that many of the articles are peculiar to America and in some cases foreigners will not know what they are. The reviewer must plead ignorance in a few instances, and, though he feels confident that he will be able to avoid 'Zwieback' with its high carbohydrate content, he is afraid he may have to give up the idea of taking 'Graham bread' or even 'Swiss chard' to obtain sufficient 'roughage'; however, in the last instance there are thirty-two familiar alternatives from which to choose.

The second part of this book is devoted to diets in various diseases, the principles of the diet are discussed and then a number of menus are given; these of course will be of only limited value in this country, but will serve as a guide even if they cannot be strictly adhered to.

Part III is on infants' and children's diets, in health and in various states of ill-health, e.g., malnutrition, acidosis.

The practitioner in this country will find the book very useful, despite the fact that it is not written from an Indian point of view; it might well serve as a model for a book on clinical dietetic in India.

SURGICAL PATHOLOGY OF THE MAMMARY GLAND.—By A. E. Hertzler, M.D. 1933. J. B. Lippincott Company, Philadelphia and London. Pp. xviii plus 283, with 240 illustrations. Price, 21s. Obtainable from Messrs. Butterworth and Company (India), Ltd., Calcutta. Price, Rs. 15-12

THIS is one of a series of monographs on surgical pathology from the University of Kansas. The outstanding features of this work are that it appears to be based entirely on personal experience, and that the author has made a special study of the subnormal, as a link between the normal and the definitely abnormal.

One of the most interesting and instructive chapters in the book is on pre-clinical carcinoma of the mammary gland; nevertheless we think that it would not be very wise to allow the paragraph entitled 'When no lump can be felt' to be broadcast amongst the laity. The stabbing pains which the author considers should be taken as serious warnings are surely very common experiences. The caution that these should be overlooked if a relative has recently died of cancer appears paradoxical but is of course sound. On the other hand the advice that the evidence should be similarly discounted if the woman has a morbid fear of cancer presents difficulties. How many women do not possess some trace of this fear, the extent to which it is evident depending on their temperaments and circumstance (v.s.)?

The point of view of the writer is quite definitely that of the clinician, or surgeon, if one can draw the distinction, and it is to him that we specially recommend this book. There are altogether 240 illustrations of clinical, morbid anatomical, and histological subjects, and we cannot speak too highly of the way they have been reproduced. The book is well up to the standard of its predecessor in this important series.

RECENT ADVANCES IN SEX AND REPRODUCTIVE PHYSIOLOGY.—By J. M. Robson, M.D., B.Sc., F.R.S.E. 1934. J. and A. Churchill, London. Pp. x plus 249, with 47 illustrations. Price, 12s. 6d.

THIS book gives a concise résumé of the vast amount of work that has been carried out during recent years on the investigation of those endocrine secretions that

have a bearing on menstruation, pregnancy and the menopause. The general impression gained from its perusal is that, although an enormous number of facts has been accumulated in recent years regarding the internal secretion of the ovaries, the pituitary and other glands, and their effect on woman's sexual life, very little is yet really known about them, and that much more must be done before this knowledge can be of much use in its clinical application. Another impressive fact that emerges from the perusal of this book is that all types of animal that have so far been used for experiment differ widely from each other and from human beings in their reactions to these hormones, so that conclusions based on the findings in animal experiment are liable to be quite misleading when applied to man. The result is that at first sight the book appears to be of little use to the practising medical man, but it will be of a definite negative value to him and as such is well worth reading. By this the reviewer means that practitioners will learn from the book that the use of hormones with an action on the sexual functions of women has at present a very limited application and that their empirical employment is quite unjustifiable.

The final chapter is devoted to this aspect of the question and it is especially recommended to the serious attention of 'up-to-date' practitioners (of which there are many) who appear to think that the greater number of new and expensive gland extracts that they prescribe for their patients the more 'scientific' they are.

ANNALS OF THE PICKETT-THOMSON RESEARCH LABORATORY. Volume IX. Influenza. Part I.—By D. and R. Thomson. 1933. Published for the Pickett-Thomson Research Laboratory by Baillière, Tindall and Cox, London. Pp. xvi plus 640, with 28 plates. Price, 42s.

THE industry of John Stuart Mill, the writer of *Principles of Political Economy*, and the dogged persistence of his friend Thomas Carlyle, when he faced the re-writing of the first volume of his *French Revolution* after the manuscript had been burnt, appear as very ordinary human qualities in the presence of these examples of almost superhuman effort displayed by David and Robert Thomson; after having completed five volumes on the streptococci which entailed reference to about ten thousand papers in this subject, they now turn to essay an attack on influenza and its literature, actuated, we surmise, partly, by a desire for personal revenge, but mainly because it was the most colossal problem that they could envisage.

The present volume is only part I, a mere introduction to the subject, of 640 crown octavo pages and twenty-eight of the usual superb plates that are a character of these *Annals*. But perhaps we are over-emphasizing our point; this is actually one of the two volumes in which the subject is to be completed, and the second volume is promised for this year.

A number of sections are devoted to the history of influenza epidemics, epidemiological features, clinical varieties, symptomatology, the age, sex, race, etc. incidence, the mortality statistics, immunology, and other such aspects of the disease, before the main subject, its bacteriology, is faced. The rôle of Pfeiffer's bacillus is the first bacteriological problem tackled; the authors' conclusion gives one an excellent summary of the two hundred and fifty pages which are devoted to the subject. They take the view that the bacillus is probably not the causative organism but that it is a very constant concomitant and that it plays an important part in the pathology of the disease, especially in the severe cases. They point out that it is a difficult organism to grow and that very often workers who report their failure to find it, fail because of their technique. This, they consider, is often because workers attempt to study far too many cases. One is rather horrified to hear that the proper bacteriological study of one plate from one case of influenza takes

about three weeks; whilst we entirely agree that the modern tendency to study large numbers, obviously in a slipshod manner, is to be deplored, there is surely some danger in drawing conclusions from the intensive study of a very few cases, especially of influenza, in a non-epidemic period. In a rapid investigation of a hundred cases in an epidemic, the *positive* findings must be important; what must be guarded against is drawing any conclusions from the *negative* findings, and we agree with the authors that such conclusions are too often drawn.

In the remaining hundred pages of the book the literature on the rôles of other micro-organisms, streptococci, pneumococci, *M. catarrhalis*, *Bact. pneumosintes*, Friedlander's bacillus, and others are reviewed.

Finally, there are two interesting sections, on the rôle of filterable viruses and on animal influenza. It is distressing to think that the pig is a martyr to influenza, but it is some compensation—to us—to think that from this fact we have obtained an important clue to the ætiology of influenza in man.

We can add nothing to what we have already said in praise of these extremely important publications. They should certainly be in the possession of every medical school and research institute library in India.

L. E. N.

A SHORT HISTORY OF THE EPIDEMIC INFECTIOUS DISEASES.—By E. W. Goodall, O.B.E., M.D. 1934. John Bale, Sons and Danielsson, Ltd., London. Pp. 113. Price, 3s. 6d.

It is on the whole very much easier to write a long book on a subject than a short one; into the one you put all you know, or can find out, but for the other you require just as much knowledge, which has to be supplemented by just as thorough research, and in addition you have all the trouble of selection of the most important points. That is to say, these are the conditions imposed if the book is to be as successful as Dr. E. W. Goodall's *Short History of the Epidemic Infectious Diseases*.

There are four chapters; the first two and the last can be read as a continuous essay on the subject; the third chapter is on specific infectious diseases, and, though here the continuity of the essay is necessarily broken, it was the only way the subject could have been treated.

The author is very insistent that the Laws of Moses were designed to combat endemic rather than epidemic disease; certainly many of them were intended to prevent the spread of bowel diseases and these can surely be epidemic.

It is a book that will be read with pleasure and profit by sanitarians and by all students of medical history.

L. E. N.

TUBERCULOSIS (IN HINDI), VOLUME I.—By S. L. Gupta, M.B., B.S. 1933. Hindi Mandir, Allahabad. Pp. xix plus 432, with 115 illustrations. Price, Rs. 6

THIS book is a most comprehensive exposition of the subject in the Hindi language, harring treatment of the disease which we presume will be given in the second volume. The book is divided into twenty-two chapters. Chapter I gives a definition and a brief history of the disease. Chapters II and III are devoted to its bacteriology and give a concise and clear description of the classification, characters, methods of staining and cultivation of the tubercle bacilli. In chapter IV is reviewed the prevalence of the disease in general and in chapter V its spread in India. The author quotes a mass of statistics and shows that, while in Europe and America with the better knowledge of the disease and the application of the modern methods of prevention the mortality from tuberculosis has very much decreased, it has considerably increased in this

country. He states that places which used to be considered as immune have shown within the last 40 years a considerable mortality from this complaint, making due allowance for the greater accuracy in diagnosis attained during recent years.

Chapter VI deals exhaustively with the etiology of the disease and in chapter VII the question of immunity is discussed and the following points are brought out. In all races nearly all men and women are infected with tubercle before adult age is reached. The infection takes place in childhood and the tubercle bacilli remain in the body in a quiescent state for years but, when from any cause the protective power of the body is reduced or the virulence of the micro-organisms is intensified, reinfection takes place giving rise to the active disease. If a child recovers from a severe attack of acute tuberculosis his immunity is increased and a majority of such subjects remain immune against reinfection, either from within or without, throughout their lifetime.

Chapters VII and IX treat of the pathology and morbid anatomy of the disease. They are quite full and exhaustive. The morbid appearances are shown in a large number of well-executed plates and other illustrations.

Chapters X to XVI are devoted to the clinical course and symptoms and chapters XVII to XXII to the diagnosis of the disease. They are all remarkably complete and up to date.

The book is an example of wide reading and the most painstaking labour, and as such will be of immense benefit to Hindi medical practitioners not acquainted with English.

B. J. S.

PSYCHOPATHOLOGY: A SURVEY OF MODERN APPROACHES.—By J. E. Nicole, L.M.S.S.A., D.P.M.R.C.P. & S. Second Edition. 1934. Baillière, Tindall and Cox, London. Pp. x plus 284. Price, 12s. 6d.

THOSE who are acquainted with the first edition of Dr. Nicole's *Psychopathology* will extend a warm reception to this second edition, now revised and enlarged by the addition of four new chapters as well as certain additions to existing chapters. As Dr. W. H. B. Stoddart observes in the foreword which he has contributed to the book, there is such a mass of informative material compressed into so small a space that some readers may run a risk of becoming confused by losing perspective. However timely be Dr. Stoddart's warning, it should not deter anyone, more especially a student of mental disorders, from paying the closest attention to every word Dr. Nicole has written. Starting with a short historical introduction, Dr. Nicole proceeds to outline, always with almost startling brevity, the psychological hypotheses of Morton Prince, Freud, Adler, Jung, Rivers, Watson, Kempf. He then reviews Breman's endocrine theories and the principal 'gland personalities'. Chapter X, one of the new additions to the book, deals with the biochemical and physiological contributions to the theories as to the causation of mental disease, besides including such factors as basal metabolism, cholesterol, blood bromide, blood urea, water balance, the hæmolytic crisis and the psychogalvanic reflex. Dr. Nicole discusses the recent work of W. Burridge of Lucknow who has advanced the theory that, in all excitation processes of nerves and muscles, two factors are concerned, namely, (a) ionic concentration and the action of electrolytes, and (b) states and degrees of colloidal aggregation depending upon hormonal activity. The ionic factor appears to depend largely on calcium metabolism while the 'colloidal' one is related to affectivity. From the biochemical approach Dr. Nicole passes on to the constitutional approach, wherein he reviews the work of Kretschner, Rodalje Willemse, and Stockard. He touches on the work of the Italian school of de Giovanni, Viola and Pende, who have recognized a so-called

microsplanchnic type in which the vertical diameters are excessively developed compared to the horizontal ones and a macrosplanchnic type with the opposite characteristics. In chapter XII Dr. Nicole reviews the accumulation of ethnological and sociological evidence in regard to the theory that individual mentality is nothing but a compressed edition of racial development. Dr. Nicole, very rightly, deplors the absence of correlation between the various schools of modern psychology and psychopathology, and attributes to this absence of correlation a good deal of the confusion to be found in modern textbooks on these subjects. He considers very briefly, but with commendable clarity, the modern position of psychology as a science and touches on the points of contact between psychology and philosophy. In the chapter entitled 'Applied Psychopathology', Dr. Nicole reviews the application of psychopathological findings to general medicine, crime, delinquency, law, education, child guidance, vocational and industrial psychology. Dr. Nicole concludes his remarks on the application of psychopathology to the law and its administration, with the very cogent observation that as the law is itself the result of collective mental factors that may contain as much of the pathological as those of the individuals it is meant to control, the validity of its concepts are open to the gravest objections. There is an interesting discussion of the concept of the 'ego' in psychiatry as well as of the so-called herd instinct. The book contains an admirable bibliography of over nine hundred books of reference in English or translated into English.

O. B.-H.

PSYCHOLOGY AND PSYCHOTHERAPY.—By William Brown, D.M. (Oxon.), D.Sc. (Lond.), F.R.C.P. Third Edition. 1934. Edward Arnold and Co., London. Pp. vii plus 252. Price, 12s. 6d.

THERE is a naïveté about Dr. William Brown which, if it figures in his lectures at Oxford, must render him a perpetual source of amusement to his pupils. The nebulousity of this book with its arithmetical appendices, evokes the mental image of a comet rather than that of a conventional textbook, which, one is led to presume, it is meant to be. Dr. William Brown begins with a paucity of psychology in which the names of Freud, McDougall, Myers and Spearman figure prominently. (Professor C. Spearman is no longer 'of London University' as Dr. Brown states, but let that pass.) Without wishing to belittle the admiration Dr. Brown displays for these four eminent men, it is nevertheless pertinent to observe that however great strides psychology has made in recent years, it can never rid itself of its fundamental defect, namely, that the object observed is identical with the instrument of observation. Further, more leisurely reflection would have shown Dr. Brown that a prerequisite of investigating the problem of intelligence and skill is some understanding of the root-problem of anxiety. As a practising psychotherapist, it should be clear to him that 'tests' of the nature described by him must function as anxiety-investigators, so that the phenomena he tries to measure with the help of mathematics are either residual or the result of auxiliary reaction formations. In other words, he is measuring the apparent flexibility of anxiety-defences. Dr. Brown is a great upholder of religion, though what he means by 'religion' is not at all clear. He maintains that everyone is at heart 'religious' but omits to define the term. He states that 'science needs to be supplemented by philosophy and religion', a rather remarkable pronouncement from so ardent an admirer of Freud! The book deals with a multiplicity of subjects, including war neuroses, psychical research, 'Buchmanism' and the relation of mind to brain. It ends finally with a mass of highly obtruse mathematical calculations which not one reader in five hundred could hope to understand.

O. B.-H.

MENTAL DEFICIENCY NURSING (SIMPLIFIED).— By O. P. N. Pearn, M.R.C.S., L.R.C.P., D.P.M. 1934. Baillière, Tindall and Cox, London. Pp. vii plus 281, with 21 figures. Price, 5s. 4d.

THIS little book is, as its author proclaims, with commendable candour, a cram book and nothing more. In India, where the care and custody of mental defectives is still the concern of private enterprise and then only on a very small scale such a book as this cannot expect to have a wide reception. Not until the problems of public health—mental as well as physical—have become for the *intelligentia* of India as fascinating as politics, can the problem of mental deficiency expect to receive any serious attention. When that time comes, if it ever does, works of this description will doubtless receive the attention that is their due.

O. B.-II.

PHYSIOLOGY. PART I (CATECHISM SERIES). Fourth Edition. E. and S. Livingstone, Edinburgh. Pp. 86. Illustrated. Price, 1s. 6d. Postage, 2d.

THIS handy little volume has presumably been designed for students as a book of ready reference, and has very well fulfilled its purpose. It should be especially useful to students preparing for their oral examination.

The book is quite small in scope, but has a good deal of new material in it and has been brought up to date. The information is accurate, well stated and brief. It is an useful contribution to the Catechism Series, and it is hoped that in the subsequent three volumes the whole subject of physiology will be thoroughly dealt with. The paper and printing are good and we congratulate the publishers for their attempt to place such useful little books within the reach of every student.

P. D.

THE WAR OF THE HUMANS AND THE MOSQUITOES OR THE STORY OF DOCTOR, HEALTH AND THE PRINCE'S HAPPINESS.— By Lieut.-Col. G. Jolley, C.I.E., M.B., Ch.B., D.P.H., D.T.M. & H., I.M.S. 1934. Macmillan and Company, Limited, London. Pp. 77. Illustrated

THIS small booklet is written in the form of a fairy tale in which mosquitoes, other insects and fish are given personalities and endowed with powers of conversation. It outlines briefly the main facts about malaria transmission and the commoner methods of prophylaxis that are employed.

The language is simple and there are numerous illustrations, but the latter are somewhat crude, and some of the statements would probably not find the approval of the scientific malariologist.

Nevertheless, this little publication will be read with profit by children, as the method of presenting the facts will be sure to impress themselves on the memory even of infants.

HOUSING CONDITIONS AND RESPIRATORY DISEASE: MORBIDITY IN A POOR-CLASS QUARTER AND IN A RE-HOUSING AREA IN GLASGOW.— By C. M. Smith. Medical Research Council: Special Report Series, No. 192. 1934. Published by His Majesty's Stationery Office, London. Pp. 36. Price, 9d.

THE reading of this report will be of special interest to research workers, as few have not had the similar experience of finding that the figures they have so laboriously collected do not prove what they hoped they would prove. Uncritically examined the figures suggest that the inhabitants of the re-housing area are more liable to respiratory disease than those of the slum area. Which, as Euclid would say, is absurd!

The report will be valuable for those who propose to undertake a similar enquiry, as it demonstrates the difficulties and the fallacies of work of this kind. We

should say that the main fallacy depends on the fact that people who live in slum areas appear to like living in them and attempt to conceal any ill-health they suffer. Anyone attempting a similar enquiry will do so with his eyes open. Let him avoid all the fallacies—if he can.

THE CHEMISTRY OF FLESH FOODS AND THEIR LOSSES ON COOKING.— By R. A. McCance and H. L. Shipp. Medical Research Council: Special Report Series, No. 187. 1933. Published by His Majesty's Stationery Office, London. Pp. 146. Price, 2s. 6d.

THE results of this very practical investigation will be of great interest to many people outside the medical profession, as well as to those within it. There are fashions in cooking, and these fashions are often engineered by persons commercially interested in the sale of cooking apparatus. Also in connection with cooking there are many 'old wives' tales', which have been blindly accepted by succeeding generations of housewives; such traditions usually have a sound foundation, but sometimes conditions have so altered that they are no longer applicable. An unprejudiced investigation of this kind is therefore very welcome.

The enquiry was a limited one: it was confined entirely to flesh foods and mainly to beef and fish. It was a purely chemical investigation, only proteins, fats, carbohydrates, salts, and water being taken into consideration. The question of vitamins was not within the scope of the enquiry.

Naturally, we cannot detail the results of these investigations; we will, however, give two examples of popular theories that have been upset. There appears to be no foundation for the 'pellicle' theory; that is, that if a joint is put into a hot oven a pellicle forms on the surface which prevents the loss of salts by evaporation. There is no difference in the loss whether the joint is placed into a hot oven, or into a cool one that is subsequently heated up. Secondly, the relative loss of salts is as great in a closed oven as in an open one.

The report is an important contribution to the science of cooking which is so closely allied to the science of medicine.

DIET AND THE TEETH: AN EXPERIMENTAL STUDY. PART III. THE EFFECT OF DIET ON DENTAL STRUCTURE AND DISEASE IN MAN.— By May Mellanby. Medical Research Council: Special Report Series, No. 191. 1934. Published by His Majesty's Stationery Office, London. Pp. 180, with numerous plates and text illustrations. Price, 5s.

MRS. MELLANBY'S work on dental caries, first published in 1918, in which she demonstrated that a sufficient supply of vitamin D was necessary in a child's diet to ensure the metabolism of calcium and phosphorus for the proper formation of the teeth, has had a revolutionary effect on the study of dental caries throughout the world. Her two previous reports, published in 1929 and 1930 respectively, dealt with dental caries in experimental animals and the effect of diet. In this report the subject is dental caries in children from different social groups.

It was naturally not possible to apply the same experimental methods in investigating dental caries in man as were employed with animals, but she has been able to show that certain structural defects in teeth are associated with dental caries, that these structural defects are dependent on deficient dietary in mother and child, and that by correcting this dietary these defects can to a large extent be overcome. Generally speaking, a properly-formed tooth does not decay; pre-natal and early natal nutrition are therefore factors of the greatest importance, but it has been shown that secondary dentine plays a considerable part in preventing decay, so that continuance of a suitable diet is also

important, and further there is evidence that under a suitable diet caries can even be checked after its onset.

An observation of importance, and one of special interest in this country, is that in countries where vitamin-D deficiency is uncommon, *e.g.*, in the tropics, where the sun's rays playing on an uncovered skin provide this, and in the Arctic regions, where oil is a

constant constituent of the dietary, dental caries is also comparatively uncommon.

The report is supplemented by a series of photomicrographs of histological sections of teeth, in forty-six full-page plates, all very well reproduced.

The whole constitutes a publication of primary importance to the medical, as also to the dental, profession.

Abstracts from Reports

TRIENNIAL REPORT ON THE WORKING OF THE RANCHI INDIAN MENTAL HOSPITAL, KANKE, IN BIHAR AND ORISSA, FOR THE YEARS 1930-32

DURING the triennium under review this hospital continued to receive patients as in the previous years from the provinces of Bengal and Bihar and Orissa.

The accommodation of the hospital remained the same as in the previous years, *viz.*, 1,014 for males and 272 for females, total 1,286.

Ever since the inception of this modern mental hospital the question of treatment of patients has always engaged our serious attention and we introduce many of the newest western methods of treatment with due regard to eastern conditions. On my return from leave in 1930, I introduced many forms of new treatment which I had picked up during my second study tour in Europe and America.

Drugs.—*Sulphur injections in mental disorders.*—An experimental study of 100 cases with sulphur injections was fully described in my last annual report (1931). Since then we have experimented with another 40 cases; 17 cases recovered and were discharged as cured; 57 cases improved, out of which 25 have since relapsed and 32 have still maintained the improvement; 66 cases did not show any improvement. This shows that the results of our experiment were quite encouraging and the sulphur injections in my opinion are well worth a trial in all fresh admissions. It gives better results in early cases of psychosis as well as in the psychoneurosis while its effect is not discouraging even in chronic cases. This therapy is now a routine treatment in this hospital in all newly admitted cases.

Hydrotherapy.—During the triennium under report 407 cases were given this treatment—the average number of hours of emersion per patient was 63.

There was a great rush on this department throughout the period under report and many patients were denied this useful form of therapy for want of accommodation. Hydrotherapy is chiefly instrumental in allaying excitement and insomnia in highly refractory cases. The scheme of building a hydrotherapy ward could not be taken up for want of funds.

Occupational therapy.—This therapy still remains as the sheet anchor of our treatment. A very brief outline of works done in this department is as follows:—

Weaving, cane and bamboo work, smithy, carpentry, tailoring, cobbling, mending clothes, mattress and pillow making, lace making, knitting, embroidery work, durrie making, gardening, domestic and office work, Joss stick making, etc.

It is our policy to make the occupational therapy departments of this hospital, which serve as excellent therapeutic agents, to be useful both to the patients as well as to the State.

Approximately 200 patients attend daily the temporary amusement hall of both sections and play various indoor games. As heretofore the hospital band continued to entertain the patients in the amusement hall, and the gramophones were used in the wards for the amusement of those patients who were unable to attend the amusement halls. During the triennium, many football and hockey matches were played with outside

teams of Kanke and Ranchi and the hospital team won many such matches. The annual sports of the hospital were held every year during Christmas week and many patients of both sexes took part in it and carried away many prizes. On New Year's eve we arrange a display of fireworks every year which the patients look forward to and enjoy immensely.

During the period under report the hospital staff staged 17 theatrical shows, and 6 vaudeville shows were staged by the combined efforts of patients and staff. Moreover when any theatrical, magic and variety show of repute visit Ranchi we always try to engage them for the patients.

Cinema.—I am happy to be able to record that the Government on the recommendation of the managing committee sanctioned the purchase of a cinema machine at a cost of Rs. 2,120-5-6.

The reference clerk of the hospital voluntarily offered to operate the cinema machine. He was trained and now works the machine as well as a regular cinema operator.

Band.—The hospital band which was organized in 1928 continues to maintain progress under the conductorship of Naik Shib Charan, one of the hospital attendants. The band now numbers 12 performers, all members of the staff.

Dietetics.—As in former years great attention was paid to the diet of the patients. A well-balanced nourishing diet largely helps the recovery rate. All patients are weighed once a month and those who steadily lose weight are segregated in the infirmary with a view to ascertaining the cause and are fed on special diet until they regain their original weight. The weight charts of patients showed a general rise.

Feasts.—During the period under report several special feasts were given to the patients on festive occasions such as the Pujas, Holi, Christmas, Id, etc.

Religion.—Due respect is paid to the religious beliefs of the patients and arrangements are made for the observance of their respective religious festivals. They are allowed to go out on these days to attend prayers, *pujas*, *kirtans*, etc. The Muhammadan patients regularly attend the *Juma* prayers under the maulavi who is one of the jamadars of this hospital.

The Hindus attend the *kirtans* whenever a pandit calls at Kanke and the Christian patients attend divine services under the Roman Catholic and Anglican chaplains.

Picnics.—Picnics are a notable feature of amusement for the patients and provide a change in surroundings which is much appreciated by the patients.

Parole.—Throughout the triennium many patients were granted local as well as Ranchi parole with or without attendants. Patients seem to enjoy this liberty and the privilege is not abused and it has a salutary effect on their general health.

Motor drives.—The hospital cars were kept busy throughout the triennium on drives. Patients of both sexes go out daily for drives by turn and are also allowed to shop at Ranchi on their return journey from drives.

It will be seen from the above abstract that the treatment of patients in the Indian mental hospital is

Parasites and fever tend to disappear rather earlier from the quinine-treated cases, but the number treated to date is small and the differences are within the limits of probable error. In all cases treated, careful records were kept of symptoms suggesting intolerance towards the drugs, and in so far as these symptoms afford an index of toxicity, here again there would appear to be no significant differences between totaquina and quinine.

In none of the cases treated to date has it been necessary to administer quinine or totaquina by intramuscular injection. Cases unable to tolerate oral treatment are not uncommon in hospital practice, and attempts have been made to develop a preparation of totaquina suitable for injection. Two such preparations are under trial, a ten per cent suspension of totaquina in olive oil, and a fifty per cent filtered solution of totaquina bi-hydrochloride. The preparation of the oily suspension was prompted by the supposition that the tissue necrosis which follows the injection of strong solutions of acid salts of the cinchona alkaloids may perhaps be due not so much to the alkaloids themselves as to their acidity.

Preliminary experiments on guinea-pigs have not been encouraging. Oily suspensions were found to be difficult to work with; in adequate concentration they do not easily pass through a suitably sized needle, while unabsorbed oil has been recognized as long as 11 days after injection. The tendency to necrosis and ulceration appears, however, to be appreciably reduced.

The necrotic effect of a fifty per cent solution of totaquina bi-hydrochloride following subcutaneous injection into guinea-pigs has not appeared greater than that produced by quinine bi-hydrochloride in similar concentration, but further work on the varying effects of a wider range of doses is necessary before totaquina in solution can be exhibited in this manner to human cases.

In addition to the above investigations on the treatment of malaria, extensive laboratory tests on the subject of culture of malaria parasites as an aid to diagnosis have been carried out, as well as examination of the nature of Mayer's reagent as an indicator of the excretion of quinine. Mosquitoes have also received a great deal of attention and the various Malayan anophelines have been studied from the point of view of infectivity by malaria, trapping and identification, larval surveys, feeding habits and the larvicidal effects of various mineral oils. Although a considerable amount of the information on the above points that is contained in this report is necessarily of special value to workers in Malaya, it may be read with profit by malaria investigators anywhere in the world.

The work on tropical typhus has been continued and a great deal has been done on elucidating its various problems, not the least important of which is the apparent proof of the identity of the 'K' type of tropical typhus and Japanese river fever. A full report of this work is promised in the near future and it will be awaited with interest. Numerous other investigations including attempts at transmission of leprosy to rats, epidemiology of diphtheria, investigation of vaccine lymph, the bacteriology of milk, extract of rice polishings, typing of pneumococci, and the study of skin diseases, have been carried out.

An interesting case of infection of a human being with *Trypanosoma lewisi* of the rat is reported, and although the parasites disappeared five days after their discovery in the blood of the patient this record is of considerable interest as indicating that this widely distributed rat parasite may become established in man.

The latter part of the report contains an account of a large amount of routine work on bacteriology, pathology, water examination, medico-legal, and chemical reports. Once again we congratulate the director in producing a record of hard work and progress which it would be difficult for any institute of similar size to equal.

REPORT BY THE DEAN ON THE WORK OF THE LONDON SCHOOL OF HYGIENE AND TROPICAL MEDICINE FOR THE YEAR ENDED 31ST JULY, 1933

This report is difficult to summarize, because, in the form in which it is presented, only the essentials are included.

Its perusal, however, shows that the expansion of the activities of the London school, to which we referred last year, still continues and considerable further progress has been made. In spite of the fact that the staff have to spend so much time in teaching, a large volume of original work is turned out and in appendix I, which is a list of papers and reports published during the year, there are over 120 publications.

The probability of the absorption of the Ross Institute by the London school is alluded to in the report, and we understand that this has since become an accomplished fact. This will still more enhance the work of the school, because as a result of this amalgamation they have acquired a body of men who are principally interested in field work in malaria.

The manner in which the London school is growing from year to year indicates that before very long it will be the chief centre of public health work (in its widest sense) in the Empire, if it has not already reached that position.

Correspondence

ACRIFLAVIN IN CEREBRO-SPINAL MENINGITIS

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR,—May I venture to suggest the trial of intravenous injection of a one-per-cent solution of acriflavin or trypaflavin in cases of cerebro-spinal meningitis?

The writer had given two injections of five cubic centimetres each of this solution to a case with success, and, though one swallow does not make a summer, it would be well worth trying, as it will be harmless and might do some good at least before the serum becomes available.

Yours, etc.,
J. B. VAIDYA.
LIEUTENANT-COLONEL. I.M.S.

NIRVAN,
ALTAMONT ROAD,
BOMBAY,
2nd May, 1934.

Service Notes

APPOINTMENTS AND TRANSFERS

THE Viceroy and Governor-General has been pleased to make the following appointment on His Excellency's personal staff:—

Colonel W. T. McCowen, *vice* Colonel G. C. L. Kerans, D.S.O., retired, to be Honorary Surgeon. Dated 23rd April, 1934.

Lieutenant-Colonel J. A. S. Phillips, Director of Public Health, Bihar and Orissa, is appointed to officiate as Inspector-General of Civil Hospitals, Bihar and Orissa, with effect from the 8th April, 1934, until further orders, *vice* Colonel H. C. Buckley granted leave.

Lieutenant-Colonel F. J. Anderson is appointed as Professor of Clinical and Operative Surgery, Medical College, Calcutta, *vice* Mr. L. M. Banarji appointed Professor of Surgery.

Lieutenant-Colonel R. E. Wright, C.I.E., Professor of Ophthalmology, Medical College, Madras, and Superintendent, Government Ophthalmic Hospital, Madras,

has been duly nominated by the Government of Madras as a member of the Medical Council of India, *vice* Lieutenant-Colonel Clive Newcomb, D.M., F.I.C., resigned.

In exercise of the powers conferred by paragraph 4 (a) and (b) of Section C of Schedule II to the Indian Aircraft Rules, 1920, the Governor-General in Council is pleased to approve Major S. M. A. Faruki to act, until further orders, as a Medical Officer for the purpose of carrying out the medical examination of candidates for the grant or renewal of Pilots' and Navigators' licences under Sections B, C, D, E and F of Schedule II to the said Rules.

Major R. S. Aspiuall is appointed to be Civil Surgeon, Simla (West), with effect from the 16th April, 1934.

The services of Captain S. Smyth are placed temporarily at the disposal of the Government of Punjab, with effect from the 1st April, 1934.

Captain S. M. K. Mallick, an officer of the Medical Research Department, is appointed as Officiating Assistant Director, Central Research Institute, Kasauli, with effect from the date on which he assumes charge of his duties.

The undermentioned Lieutenants (on probn.) are restored to the establishment:—

23rd April, 1934

W. M. E. Anderson.
J. W. D. Goodall.
P. I. Franks, with seniority 23rd April, 1933.
H. B. Wright, with seniority 23rd April, 1933.
J. M. David.
D. P. Dewe.
M. G. Lenne.
G. E. S. Stewart.

LEAVE

Colonel H. C. Buckley, Inspector-General of Civil Hospitals, Bihar and Orissa, is granted leave on average pay for 8 months, with effect from the 8th April, 1934.

Lieutenant-Colonel A. D. Stewart, C.I.E., Director, All-India Institute of Hygiene and Public Health, Calcutta, is granted leave on average pay for 1 month and 11 days, with effect from the 16th July, 1934. He is also permitted to prefix to that leave the Institute vacation from the 27th April to the 15th July, 1934.

RETIREMENTS

Brevet-Colonel J. McPherson, C.I.E., K.H.S. Dated 16th October, 1933.

Lieutenant-Colonel A. D. White. Dated 26th February, 1934.

Lieutenant-Colonel C. R. O'Brien. Dated 4th April, 1934.

PROMOTIONS

Majors to be Lieutenant-Colonels

Dated 5th May, 1934

B. Z. Shah.
V. R. Mirajkar.
A. J. D'Souza, M.C.
Dated 23rd May, 1934
B. C. Ashton.
Dated 26th May, 1934
M. M. Khan.
E. R. Daboo, M.C.
B. G. Mallya.

Captains to be Majors

F. R. W. K. Allen. Dated 5th April, 1934.
M. Taylor. Dated 18th April, 1934.
W. Lawie. Dated 28th April, 1934.
The King has approved the following promotion:—
The seniority of Lieutenant (on probn.) J. Edis-Myers is antedated to the 5th February, 1933.
The seniority of Lieutenant (on probn.) W. G. Kennedy is antedated to the 19th February, 1933.

Notes

FICHERA 365

A NEW ATTEMPT IN THE TREATMENT OF CANCER

HITHERTO, attempts to establish a chemotherapy of cancer have to be considered more or less as failures. Experiments with lead and other heavy metals have shown that only in doses toxic for the organism itself, did such metallic compounds have any influence on the tumour cells. Again, researches into the peculiar metabolism of cancer cells, *viz*, increased glycolysis, failed to suggest any remedial measure.

Professor Gactano Fichera, Director of the Surgical Clinic in Pavia University, Italy, and Director of the National Research Institute, Vittorio, Emanuele III, however, realized as early as 1910 that the real cause of cancer must lie in disturbances of oncogenous equilibrium in the organism. By studying the results of implantations of a great variety of tissues in cancerous organisms, he learned to differentiate between the organs containing cancer-growth-promoting substances and those containing the cancer-growth-inhibiting substances; the organs containing cancer-growth-inhibiting substances, he designated as 'antiblastic organs'. In the course of the last twenty-five years, Professor Fichera has succeeded in making extracts out of the antiblastic organs, and these extracts seem to restore the defensive bodies of the organism against tumour cells.

Injection of such extracts in a good number of cancer patients have been found to bring about specific lysis of cancer cells, without, however, any effect on the normal epithelial and mesenchymal cells. Further, it has also been found that these extracts, injected in high dosage, do not produce any by-effect and are completely harmless to the patient. In certain patients, again, injections have led to the disappearance of relapsing and metastatic tumours, unsuitable for surgical or irradiation treatment. In still other cases, cancerous growth has been altogether arrested and there has been no relapse during a period of 2 to 3 years. In primary cases no more fit for surgical or irradiation treatment, Fichera succeeded in getting a regress in 9 per cent of the total cases and a complete arrest in a further 8 per cent of the cases. All these cases have been under clinical observation during the last three years. It is expected that this treatment will have still better results when applied in early cases or as supplementary to operation or irradiation treatment.

The first communication to the medical profession was made by Professor Fichera himself at the last International Congress of Cancer Research in Madrid, Spain, October 1933. A further lecture by the author was given in the Ministry for Public Health, Berlin, in December 1933.

In his first trial he employed extracts prepared by himself, and the stability of which, however, was very limited. In co-operation with the scientific laboratories of the I. G. Farbenindustrie, he has now succeeded in preparing the extract into a stable and sterile form. The preparation is at present put on the market by Messrs. Bayer-Meister Lucius, under the name of 'Fichera 365', further details of which can be had from Messrs. Haverro Trading Co., Ltd., P. O. Box 642, Commerce House, Bombay. References to the scientific publications of Professor Fichera, which have been published mostly in the Italian and German languages, can also be had from Haverro Trading Co., Ltd.

PROPELLERS TESTED BY MEANS OF X-RAYS

'METALIX' x-ray apparatus have for some time been in regular use in German aeroplane factories, where various parts of aeroplanes are subjected to x-ray examination. This method of examining aeroplane parts is also being generally adopted in America, as is

indicated by the following recent statement in the *Chicago Daily News*:—

'The experiments of Professor George S. Clark at the University of Illinois in Urbana-Illinois have shown that x-rays constitute the simplest, quickest and most effective means of examining aeroplane propellers. In the course of one of these tests a propeller was dismounted, examined and remounted in the brief space of 45 minutes. It is expected that in the near future an x-ray apparatus will form part of the regular equipment of airports and aeroplane workshops'.

'VELOX' DISINFECTORS

THE essential point in disinfection is penetration. No matter what quantity of steam be used, or how hot it is, without the act of penetration that steam is useless. Therefore in using a disinfectant that lacks the power of penetration, one is not taking the precaution that is necessary to ensure against the spread of infectious disease.

Seldom do we hear of a firm of manufacturers who have been willing to carry out well-planned and extensive tests and experiments on the subject of sterilization and disinfection. But in the case of the manufacturers of the Velox disinfectant this has been done.

The Velox disinfectant employs the Geneste Herscher principle which is considered to be equal in efficiency to any, and mechanically the most adaptable for disinfectors in modern practice. These machines are lined longitudinally with solid drawn-copper tubes; the steam thus surrounds the inner chamber, which can be far more easily examined than in the ordinary jacketed machine. A high vacuum is obtained and maintained, a temperature of 249°Fahrenheit is continuous during disinfection as the steam inside the surrounding tubes is kept at fifteen pounds per square inch pressure, and the articles are thus produced perfectly dry and disinfected.

Velox disinfectors are finding places in prominent institutions in India, and we are informed that plants are being used at the King Edward VII Pasteur Institute and at the Khasi Mission Hospital, Shillong; at the Pasteur Institute, Kasauli; by the Port Health department, Calcutta; by the Ootacamund and Ahmedabad municipalities; on the G. I. P. railway; and in many other institutions and departments in the country.

Messrs. Balmer Lawrie and Company, Limited, are the agents in India.

Further particulars on page lxii.

THE DOSE OF SOLGANAL B OLEOSUM

THE commencing dose of the above preparation recommended by the manufacturers is 0.01 gramme not 0.1 gramme, as, through a printing error, it appeared in a letter we published in our June issue.

'HYPOLOID' BISMUTH OXYCHLORIDE

BISMUTH OXYCHLORIDE is a water-insoluble salt for the injection treatment of syphilis.

'Hypoloid' brand bismuth oxychloride, suspended in a sterile isotonic saline solution, is prepared by Burroughs Wellcome and Company, and issued in rubber-capped bottles of 25 c.cm. containing 0.1 gramme of the medicament per cubic centimetre. It satisfies the most stringent tests for the effective introduction of bismuth into the tissues. It is well tolerated in respect of pain and nodosities and is absorbed at a uniform rate, which, without causing toxic symptoms, produces effective anti-spirochaetal effect.

THE VALUE OF DIFFERENT GOLD PREPARATIONS IN THE TREATMENT OF PULMONARY TUBERCULOSIS

SUMMARIZING their results in a paper in the *Patna Journal of Medicine*, Dr. Kesava Pai and his colleagues

at the Government Tuberculosis Hospital, Madras, give the following table:—

	Cases treated	Cases benefited
Sanocrysin	84	49
Solganal	65	42
Solganal B oleosum ..	11	9

Whilst they consider that the number of cases treated with the last-named drug are too few on which to base any conclusions as to its greater efficacy, they point out that Solganal B oleosum is injected intramuscularly, is absorbed more slowly, and therefore gives rise to fewer reactions than do even smaller doses of the intravenous drugs.

SANOCRYSIN AND OLEO-SANOCRYSIN

WE are notified by H. R. Napp, Limited, 3 and 4, Clements Inn, London, W.C. 2, that, as from the 1st April, they have been appointed sole distributors of Sanocrysin and Oleo-Sanocrysin in the British Empire (excluding Australia, New Zealand, Canada, Gibraltar and Iraq).

Publishers' Notice

SCIENTIFIC Articles and Notes of interest to the profession in India are solicited. Contributors of Original Articles are entitled to receive 25 reprints *gratis*; additional reprints can be obtained on payment. No reprints will be supplied unless contributors ask for them at the time of submitting their manuscripts.

Communications on Editorial Matters, Articles, Letters and Books for Review should be addressed to THE EDITOR, *The Indian Medical Gazette*, c/o The Calcutta School of Tropical Medicine, Central Avenue, Calcutta.

Communications for the Publishers relating to Subscriptions and Advertisements should be addressed to THE PUBLISHERS, *The Indian Medical Gazette*, P. O. Box No. 54, Calcutta.

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Original Articles

MALARCAN IN THE TREATMENT OF INDIAN STRAINS OF MALARIA

By R. N. CHOPRA, C.I.E., M.A., M.D. (Cantab.)

LIEUTENANT-COLONEL, I.M.S.

B. SEN, B.Sc., M.B.

and

S. K. GANGULY, M.B.

(Department of Pharmacology, School of Tropical Medicine, Calcutta)

UNTIL recently quinine was the only drug employed in the treatment of all forms of malaria, but Acton (1920) showed that, while it cured 90 per cent of malignant tertian infections if properly given, in benign tertian infections the primary cures were not more than 25 to 30 per cent even after a two months' course. Cinchona febrifuge which contains all the alkaloids of cinchona bark gave a cure rate of about 50 per cent (Acton *et al.*, 1921) so that it could be reasonably concluded that there must be alkaloids other than quinine which are responsible for this enhanced rate of cure. These other alkaloids were tested by him individually. Cinchonine and quinidine in 10-grain doses twice daily gave a cure rate of 60 per cent of benign tertian infection after a short course. Fletcher (1923) tested the action of different cinchona alkaloids individually in the treatment of malaria and testified to their having well-marked anti-malarial properties. The anti-malarial action of these alkaloids, however, varied in potency; quinine and quinidine, for instance, were more powerful than cinchonine and cinchonidine. It would appear from this that not only do the different cinchona alkaloids vary in their anti-malarial activity generally but that their action on different species of the plasmodium also varies. Attempts have, therefore, been made by workers to develop compounds of these alkaloids by altering the side chains round the main nucleus and by combining them with other substances, such as aniline, acridine or other suitable compounds. In this way it is hoped that compounds with enhanced anti-plasmodial activity against one or other species may possibly be produced which will act on both the sexual and the asexual cycle, or that perhaps such compounds will even have a destructive action on the sporozoites injected by the mosquito bite and in this way act as true prophylactics.

'Malarcan' appears to be a product which has been prepared with this end in view. It was supplied to us through the courtesy of Dr. P. Rezak of Vienna in order that we might test its therapeutic efficacy against malaria in India.

The drug is sold in the form of tablets which have a bright yellow colour. The makers recommend two tablets to be given every four hours day and night, i.e., 12 tablets within 24 hours, till the patient no longer shows any signs of fever. This is often not feasible and in our trials we gave the requisite amount of the drug in 3 or 4 divided doses daily. They recommend that tablets should be swallowed after a meal or light refreshment, with water. After the fever has subsided it is advised that two tablets be taken three times daily. The total dose necessary varies according to the severity of the attack from 80 to 120 tablets. In children smaller doses are recommended according to age.

The makers also recommend the drug as a protective against malarial fever, two tablets being taken daily after any meals during the period the patient is exposed to infection and two tablets every other day for three weeks after leaving the malarial zone. The method of administration advised in itself shows that the drug is not claimed to be a true prophylactic, inasmuch as it is not expected to destroy the sporozoites injected by the mosquitoes, but to act as a curative in the same way as quinine does. The drug, it is said, produces no toxic or untoward symptoms and does not precipitate blackwater fever, like quinine does in susceptible patients.

'Malarcan' is said to be a compound of a stereo-isomeric base of methyl-cupreine with methyl-acridinium-chloride and hydrocholic acid. It is thus probably a derivative of quinine or quinidine and, in high dilutions, it shows fluorescence under ultra-violet light.

The anti-malarial properties of Malarcan on the Indian strains of malaria were tested by us in a series of 29 patients in the Carmichael Hospital for Tropical Diseases. Patients were admitted under the senior author and soon after admission thick and thin films from the peripheral blood were examined. In some cases a parasite count was also made. Except in urgent cases the anti-malarial treatment was withheld for a few days in order to identify correctly the species of the infecting parasite as well as to make sure that there was no chance of spontaneous recovery. The patients were then put on Malarcan, and no other drugs except purgatives were given. After the completion of treatment the patients were kept under observation in the hospital for a fortnight, daily examinations of the blood were made for 15 consecutive days, and a blood culture for malarial parasites was taken in many patients before discharge. It would undoubtedly have been advantageous if the patients could have been kept under observation for a longer period after treatment, but as soon as the temperature settled down they wanted to leave the hospital and it was with great difficulty that they could be persuaded to stay for a fortnight. Besides, in an endemic

area like Calcutta it is very difficult to distinguish between a relapse and a reinfection, but by this procedure it was hoped that an idea could be formed regarding the efficacy of the drug. During these trials regard was paid to the effect of the drug :

(a) on the temperature and other symptoms met with in the disease,

(b) on the sexual and asexual forms of the parasites and the time taken for their disappearance from the peripheral blood, and

(c) on the splenic enlargement and relapse;

(d) on the relapse rate;

note was also taken of any untoward effects produced.

In the table opposite details of 29 patients on which this drug was tried are given.

In case 1 two tablets thrice daily up to 34 tablets were given, and, in case 2, six tablets in 24 hours. In these patients the effect of the drug was only observed on the sexual forms of *Plasmodium falciparum*; these patients had crescents in the blood and suffered from no other symptoms. It will be observed that no effect whatsoever was produced and the crescents persisted in the peripheral blood after administration of Malarean.

The drug was then tried in smaller doses than those recommended by the makers in order to see what effects were produced on the malarial parasites circulating in the blood as well as on the symptoms produced. In cases 3 to 15, the patients were mostly given two tablets of Malarean three times a day for 5 to 6 days. They were suffering from either *Plasmodium falciparum* or *Plasmodium vivax* infection and in one patient there was a mixed infection with these two species. A perusal of the table will show that in cases of *Plasmodium falciparum* infections the asexual forms generally disappeared within three days of the administration. The crescents were not touched in any case. As regards the infections with *Plasmodium vivax*, both the sexual and asexual forms disappeared from the peripheral blood within 3 to 4 days, that is to say, the parasites of this species took somewhat longer to disappear than those of *Plasmodium falciparum*. Further details of the treatment are given below :—

Case 3.—He had been given 6 tablets of Malarean and 4 doses of plasmochin, 0.01 gm. each, a fortnight ago; this time 6 tablets a day for 6 days; left hospital on the eighth day.

Case 4.—Two tablets thrice daily for 5 days. No parasites found for 9 days.

Case 5.—One tablet b.d. up to 7 tablets; scanty crescents on the fourth day; rings and crescents on the eighth day.

Case 6.—Had been given 7 tablets 9 days before; 2 tablets b.d. up to 17 tablets and plasmochin for 2 days; crescents persisted and scanty rings found on the fifteenth day.

Case 7.—Half tablet b.d. for 5 days; parasites reappeared on the eleventh day.

Case 8.—Two tablets t.d.s. for 5 days, no parasites for 15 days, culture sterile.

Case 9.—Two tablets 4 times a day for 5 days; no parasites for 15 days; culture sterile.

Case 10.—Two tablets b.d. for 5 days; no parasites for a week.

Case 11.—Two tablets t.d.s. for 5 days; no parasites for a week; culture sterile.

Case 12.—Two tablets t.d.s. for 5 days; no parasites for 15 days; culture sterile.

Case 13.—Two tablets 4 times a day for 5 days; left hospital.

Case 14.—Two tablets 4 times a day for 5 days; had a course of atabrin 5 months ago.

Case 15.—Two tablets t.d.s. for one day then b.d. for 4 days; no asexual forms seen for 10 days; crescents disappeared after 4 days.

Out of this series of 13 patients, 4 (30 per cent) showed no signs of recrudescence of the attack while under observation for the fortnight following the treatment, while 3 (23 per cent) apparently relapsed and showed the same species of parasite which they originally carried. The remaining 6 unfortunately left the hospital before the period of observation expired, but all of them were parasite-free on the date of discharge.

Of the remaining, 10 patients received 12 tablets of Malarean daily for 7 to 8 days, that is, the full dose advised by the makers. Of this series, 6 (60 per cent) were apparently cured, and three relapsed while still under observation in the hospital; one left hospital before the expiry of the period of observation. These patients suffered from either *Plasmodium falciparum* or *Plasmodium vivax* infection except two patients who had mixed infections.

Case 16.—Four tablets t.d.s. up to 80 tablets; no asexual forms for 15 days; crescents persisted.

Case 17.—Two tablets 4 times a day up to 40 tablets; again 16 tablets a day up to 64 tablets; no parasites for 17 days; culture sterile.

Case 18.—Four tablets t.d.s. up to 80 tablets; no asexual forms seen for 15 days; culture sterile; crescents persisted and were removed with plasmochin.

Case 19.—Four tablets 4 times a day till 80 tablets; no parasites for 5 days.

Case 20.—Twelve tablets a day till 80 tablets; parasites disappeared from the fifth day of treatment; parasites reappeared on the fifteenth day; then treated with atabrin.

Case 21.—Twelve tablets a day up to 80 tablets; parasites on the tenth day.

Case 22.—Two tablets 4 times a day up to 80 tablets; no parasites from the sixth day of treatment for 15 days.

Case 23.—Two tablets 6 times a day up to 80 tablets; parasites on the fourteenth day and treated with atabrin.

Case 24.—One tablet t.d.s. up to 15 tablets; parasites still present, then 2 tablets t.d.s. up to 30 tablets; no parasites for 12 days.

Case 25.—One tablet t.d.s. up to 15 tablets; parasites on the fourth day. Two tablets t.d.s. up to 30 tablets; parasites disappeared from the second day of treatment for 12 days; culture sterile.

Case 26.—Two tablets t.d.s.; treatment stopped on the third day on account of a reeling sensation which continued for 5 days.

Case 27.—Had been given 8 tablets a day for 5 days three weeks ago; this time 12 tablets a day; treatment stopped in the middle of the course on account of a reeling sensation.

Case 28.—Two tablets thrice daily till 7 doses.

Case 29.—Two tablets in 24 hours.

TABLE

No.	Race, sex and age	Recent treatment	FINDINGS BEFORE TREATMENT				FINDINGS DURING AND AFTER TREATMENT								Resultant effect on plasmodial infection	
			Species of parasite	Temp.		Sexual		2nd day		3rd day		4th day		5th day		
				Asexual	Sexual	Asexual	Sexual	Asexual	Sexual	Asexual	Sexual	Asexual	Sexual			
1	M., M., 28	No	M.T.	98.2°	0	Sc.	0	Sc.	0	Sc.	0	Sc.	0	Sc.	Persisted.	
2	H., M., 37	Yes	M.T.	98°	0	Sc.	0	Sc.	0	Sc.	0	Sc.	0	Sc.	Do.	
3	H., M., 37	No	M.T.	99.6°	0	0	0	0	0	0	0	0	0	0	Undetermined.	
4	I.Ch., M., 20	No	M.T.	100°	+	0	Less than 40 (rings)	0	0	0	0	0	0	0	Cleared.	
5	M., M., 8	..	M.T.	101°	Sc.	0	Less than 40	0	0	0	0	0	0	0	Persisted.	
6	M., M., 8	Yes	M.T.	99°	Sc.	Sc.	40	Sc.	Sc.	Sc.	Sc.	Sc.	0	v.sc.	Do.	
7	A.-I., F., 24	..	B. T.	104°	2,000	Sc.	Sc.	0	0	0	0	0	0	0	Do.	
8	A.-I., F., 11	Yes	B. T.	99°	7,720	Sc.	Sc.	0	0	0	0	0	0	0	Cleared.	
9	E., M., 47	Yes	B. T.	98°	+	0	0	0	0	0	0	0	0	0	Do.	
10	A.-I., F., 13	Yes	B. T.	103.6°	+	0	0	0	0	0	0	0	0	0	Undetermined.	
11	H., M., 16	Yes	M.T.	103°	+	0	0	0	0	0	0	0	0	0	Do.	
12	M., F., 35	..	B. T.	102°	600	0	0	0	0	0	0	0	0	0	Cleared.	
13	H., M., 25	..	B. T.	103°	+	0	Sc. (B.T.)	Sc.	Sc.	Sc.	Sc.	Sc.	0	0	Undetermined.	
14	M., M., 35	No	B. T.	102.6°	3,600	0	0	0	0	0	0	0	0	0	Do.	
15	H., M., 54	..	M.T.	99.3°	Sc.	0	Sc.	0	0	0	0	0	0	0	Undetermined (crescents cleared).	
16	H., M., 38	..	M.T.	102°	3,600	0	2,300	0	640	Sc.	+	0	0	1,000	Cleared (crescents persisted).	
17	M., M., 35	..	B. T.	103°	+	Sc.	+	v.sc.	0	0	0	0	0	0	Cleared.	
18	H., M., 38	..	M.T.	102.8°	3,600	0	2,300	0	640	Sc.	1,200	Sc.	0	1,000	Cleared (crescents persisted).	
19	M., M., 25	..	Q. T.	101°	800	0	400	v.sc.	0	0	0	0	0	0	Undetermined.	
20	H., M., 25	..	B. T., M.T. & Q. T.	103.4°	2,000 (no crescents)	0	1,600 (no crescents)	800 (no crescents)	Sc.	Sc.	Sc.	Sc.	0	0	Persisted.	
21	H., M., 22	..	B. T.	103°	5,200	0	1,500	0	0	0	Sc.	Sc.	Sc. (crescents)	0	Do.	
22	A.-I., F., 15	..	B. T.	104°	+	+	+	+	+	+	+	+	+	+	Cleared.	
23	M., M., 30	..	B. T.	102.8°	+	0	+	+	+	+	+	+	+	+	Persisted.	
24	H., M., 6	..	M.T.	99.4°	+	0	+	+	+	+	+	+	+	+	Cleared.	
25	A.-I., F., 7	..	B. T.	102°	+	0	Sc.	0	0	0	0	0	0	0	Persisted.	
26	H., M., 20	Yes	B. T.	100.8°	4,200	Sc.	+	+	+	+	+	+	+	+	slow fever persisted	
27	H., M., 25	..	M.T.	100°	Sc.	0	+	+	+	+	+	+	+	+	3	
28	H., M., 35	..	B. T.	100°	Sc.	0	+	+	+	+	+	+	+	+	1	
29	H., M., 22	..	B. T.	102°	5,600	0	+	+	+	+	+	+	+	+	2	

In every case the parasites, except the crescents, disappeared from the blood within four days. Of the three patients who relapsed one suffered from benign tertian and two were cases of mixed infections. That the drug had no action on the sexual forms of *Plasmodium falciparum* (ereseents) is shown by the fact that in case 1 they were only scanty ereseents, no asexual forms being present before treatment; 34 tablets produced no effect on these parasites. In case 2 six tablets were given without any decrease in the number of ereseents. Case 15 was peculiar in that the ereseents could not be found four days after the treatment. As the patient had only scanty ereseents before the treatment was begun, their disappearance was probably spontaneous and not the result of the treatment. In case 16, the drug appears to have stimulated the growth of gametocytes and stopped that of the asexual forms.

A careful study of these cases shows that the action of Malarean closely resembles that of quinine in that it is equally effective against the asexual and sexual stages of *Plasmodium vivax* and *Plasmodium malarie* and has no action on the sexual forms of *Plasmodium falciparum*. Its action is also somewhat stronger on the asexual forms of malignant tertian than on those of benign tertian. The effect of the drug on the splenic enlargement is practically the same as that of quinine. After treatment with Malarean, there was a great reduction in the size of the spleen where this organ was soft. The drug produced no appreciable effects on the blood pressure, pulse or respiration.

Certain untoward symptoms were met with during the treatment with Malarean which, however, were not serious. Cases 26 and 28 had a reeling sensation which gradually disappeared when the drug was stopped. In two patients flatulence, abdominal discomfort and insomnia developed, but they were temporary and were got rid of with a dose of carminative or a bromide mixture.

Summary and conclusion

(1) Malarean is said to be a compound of a stereo-isomeric base of methyl-eupreine combined with methyl-aeridinium-chloride and hydrochloric acid. It is probably a derivative of quinine or quinidine.

(2) The effect of Malarean on Indian strains of malaria closely resembles that of quinine. Its action on the asexual forms of malignant tertian is rapid, while on the crescents it has no action whatsoever. On the sexual and asexual forms of benign tertian and quartan the drug has an action similar to that of quinine.

(3) The action of the drug on relapses is also very similar to that of quinine.

(Continued at foot of next column)

GLABELLAR PRESENTATION, ITS INCIDENCE AND TERMINATION

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VARIATIONS in the degree of flexion in cephalic presentations have been noted for a long time by obstetricians and different names have been given to various presentations depending upon the degree of flexion of the head. Thus we have vertex, brow and face presentations; and among vertex presentations, we have the sub-classifications, posterior fontanelle and anterior fontanelle presentations, depending upon whether the head is fully flexed, hyper-flexed, flexed to the normal extent, or slightly under-flexed. That such variations in the degree of extension might also occur cannot be denied. So far, however, the literature has got but few references to any definite types that have occurred, and no nomenclature has been suggested to these variations. It will be seen from a description of cases given below that variations in the degree of extension occur with sufficient frequency to justify this nomenclature.

My attention was first drawn to this abnormality about a couple of years ago, and since then there have occurred ten other cases which seem to me to justify the suggestion that a definite nomenclature should be introduced for these abnormal presentations. They deserve a separate description in the literature and hence the new nomenclature suggested.

Glabellar presentation.—This is a presentation wherein the head lies in a position of extension

(Continued from previous column)

(4) Malarean is not a toxic drug and in the doses recommended by the makers it produced no serious untoward symptoms.

(5) The drug is about 4 to 5 times more expensive than quinine and appears to have no advantage over that drug.

REFERENCES

Acton, H. W. (1920). Treatment of Benign Tertian Fever. *Lancet*, Vol. I, p. 1257.

Acton, H. W., Curjel, D. F., and Dewey, J. O. (1921). The Diagnosis and Treatment of Benign Tertian and Malignant Tertian Fevers. Sections II and VI. *Indian Journ. Med. Res.*, Vol. VIII, pp. 762 and 853.

Fletcher, W. (1923). *Notes on the Treatment of Malaria with the Alkaloids of Cinchona*. John Bale, Sons and Danielsson Ltd., London.

Kingsbury, A. N. (1931). *The Annual Report of the Institute for Medical Research, Federated Malay States*. The Federated Malay States Government Printing Office, Kuala Lumpur.

Rennie, P. M., Acton, H. W., Curjel, D. F., and Dewey, J. O. (1921). The Diagnosis and Treatment of Benign Tertian and Malignant Tertian Fevers. Section V. *Indian Journ. Med. Res.*, Vol. VIII, p. 787.



Fig. 1.—Vertex.



Fig. 2.—Brow.



Fig. 3 (a).—Glabellar.



Fig. 3 (b).—Glabellar



Fig. 4.—Face



Fig. 5.—Orbicular.

midway between a brow and a face. The diameter of engagement may be said to be the mid supra-maxillary bregmatic diameter which is the distance between the mid-point of the superior maxilla and the posterior point of the bregma. On actual measurement of a large number of cases, it has been found that this diameter varies between 4 and 4½ inches. The following cases give the details of glabellar presentations conducted at this clinic within the last two years :

Case 1.—A II-para, first child delivered naturally; patient was admitted in labour, the membranes having ruptured 12 hours before admission. A vaginal examination made after admission revealed the fact that the cervix was nearly fully dilated, an incompletely extended face was presenting, and the head was still fairly high at the brim of the pelvis. Fœtal heart—126, mother's pulse—68. Axis-traction forceps was applied without effect. Internal podalic version was then performed and an asphyxiated female child weighing 6 pounds was extracted and revived by the usual methods. The examination of the face revealed the fact that the caput that had formed on the presenting part was seen over the upper lip, the malar eminence, the supra-orbital ridges and a portion of the frontal eminence.

The striking fact about it is that the lower jaw does not share in the caput formation; nor is there any trace of caput formation near the anterior fontanelle. The mid-point in this presentation is the glabella, and it is for this reason that the suggestion is put forward that these presentations should be called 'glabellar' presentations. They are often mistaken for a face presentation, because if the finger is passed fairly high up, the mouth can be easily reached and even the lower jaw. The other cases which occurred during this period were :

Case 2.—A III-para, first two children delivered naturally; diagnosed by abdominal palpation as a right occipito-posterior presentation. Membranes ruptured prematurely. Twelve hours after the rupture of membranes a vaginal examination was made and it was found that the os was a little more than two-fifths dilated; the head was engaging transversely; the upper lip and nose and supra-orbital ridges could be easily felt. A 'glabellar' presentation was diagnosed. Patient was put under deep anaesthesia, cervix dilated, internal podalic version performed and a live male child weighing 6½ pounds was extracted. The caput was well marked over the forehead, nose and upper lip.

Case 3.—A II-para, first child delivered by forceps; was admitted in labour and was diagnosed by the house surgeon on duty as a case of face presentation. The os was four-fifths dilated and the presenting part in the mid-cavity. An hour afterwards, on examination, it was found that the presentation was really midway between brow and face. The fœtal heart was 156. Axis-traction forceps was applied after promoting slight extension of the presenting part and a male child was extracted slightly asphyxiated, which was revived by the usual means.

Case 4.—A VII-para, all other children born naturally; diagnosed by the house surgeon on duty as a brow presentation. Admitted with a temperature of 103.2°, pulse 130, fœtal heart inaudible. Axis-traction forceps applied and with much difficulty, a dead female child was extracted. The caput formation over the

forehead, eyebrows, nose and upper lip, revealed the fact that this was also a 'glabellar' presentation.

Case 5.—A primipara, admitted with the os fully dilated, medium-sized caput present on the forehead, supra-orbital ridges and the upper jaw. Patient had been in labour for over 24 hours and was exhausted, the tongue being dry and coated. Presenting part was not fixed and was felt above the brim. Os was fully dilated; membranes were absent; uterus not tonically contracted. Internal podalic version was done and a deeply asphyxiated child was extracted weighing 6½ pounds which could not be revived.

Case 6.—A primipara, admitted with a history of having been in labour for over 12 hours, and membranes ruptured 6 hours prior to admission. Measurements of the pelvis—normal; general condition—good; uterus—full-term and acting; diagnosed as left mento-anterior by the house surgeon on duty. Fœtal heart nearing 160; mother's pulse—88. Axis-traction forceps applied and a deeply asphyxiated child weighing 5 pounds was extracted with considerable difficulty, but revived by usual methods. The caput formation revealed that this was a 'glabellar' presentation as well.

Case 7.—A V-para, other labours natural. In labour for nearly 20 hours; membranes ruptured more than 12 hours previous to admission. Uterus was full-term, acting strongly, the head was fixed. Vaginal examination revealed that the os was fully dilated, cephalic presentation; the superciliary ridges, eyes, nose and the upper lips could be felt. Fœtal heart—120, mother's pulse—100. Axis-traction forceps applied and a live male child weighing 7 pounds delivered. Presentation: 'glabellar'.

Case 8.—Primipara, admitted with a history of having been in labour for 15 hours. On examination, temperature—101°, mother's pulse—120, slight œdema of the feet, tongue coated, uterus—full-term, acting slightly; position of the fœtus—right occipito-anterior?; head—fixed; fœtal heart not heard; pelvic measurements normal. Diagnosed as a face presentation by the house surgeon on duty. On further examination, this was found to be a case of 'glabellar' presentation. Axis-traction forceps applied and a dead female child weighing 5 pounds was extracted with much difficulty.

Case 9.—A primipara, admitted with a history of labour for 3 hours; pelvic measurements—normal; uterus—full-term, acting slightly; head engaging; membranes ruptured 3 hours after admission. As the os was only two-fifths dilated, patient was given a draught and allowed to rest. Eight hours later the os was fully dilated, fœtal heart nearing 160. Axis-traction forceps applied and a female child weighing 5½ pounds was extracted without difficulty. The caput formation revealed the fact that this was also a typical case of 'glabellar' presentation.

These nine cases show that there is an intermediary position between a face and a brow, which presents definitely and where the difficulties of delivery through natural powers are considerable. The best method of delivering these cases would seem to be by performing internal podalic version, if the conditions permit; or by extending the presenting part, converting it into a face presentation and delivering by the application of forceps. It may here be stated that internal podalic version has been the method of choice in the delivery for some time past, with gratifying results, in those cases where, with a fairly normal pelvis and no marked degree of disproportion, the cause of delay has been due to the presenting part not

being flexed, and being fairly high up above the brim of the pelvis.

On looking up the literature, I find that Professor Dougal of Manchester has also referred to a very similar case before the Royal Society of Medicine in 1929, and suggested that the presentation was due to an extended lower jaw. Professor Dougal called it an unusual variety of face or brow presentation, but we think that the term 'glabellar presentation' is more appropriate. The description given by Professor Dougal is as follows:—

'The patient was having violent pains, but her general condition was perfectly good. On holding back the perineum with the fingers, it was possible to see the orbital ridges, eyes, upper lip and open mouth of the child and the caput was well marked over the eyes, nose and upper lip, the last being much swollen and resembling a large polypus. Careful examination under anæsthesia showed the head to be lying in the right mento-anterior position, with the lower jaw firmly caught above a little to the right of the symphysis pubes.

He inserted his hand into the vagina, pushed up the presenting part and flexed the lower jaw which came down with a distinct click. The presentation was now a simple face, and he was able to complete the delivery with forceps quite easily. The child was alive and weighed 6½ pounds. Its appearance was not prepossessing, as there was a large caput over the face and the lower jaw was so much displaced backwards that the child appeared completely devoid of chin. (The mother's pelvis was apparently normal).'

This description exactly coincides with the description of our own cases, and there can be no doubt that this was a similar case, better styled a 'glabellar' presentation. The drawings* (plate VIII) make this quite clear.

Orbicular presentation.—Here the face is over-extended and the mouth presents. One case of this description was encountered within the last two years. It is naturally indistinguishable from a face presentation, but a careful vaginal examination reveals the fact that while the nose, mouth, and lower jaw are easily felt, the supra-orbital ridges and malar eminences are not easily within reach. The caput formation is distinctive, the eyebrows not being affected in the caput. The management of this particular case was similar to that of a face presentation and does not call for any remarks. Plate VIII, figure 5, makes the position clear, as to the abnormality in the face presentation, and as the orbicularis oris is so pronouncedly prominent, it is suggested that this may be styled 'orbicular presentation'.

The drawings showing the caputs in cephalic presentations in the varying degree of flexion and extension are given in plate VIII.

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*Photographs from which these drawings were made were sent to us by the author. The drawings are such accurate copies of these photographs that the reproduction of the latter would be superfluous. The only excuse for thus duplicating the illustrations would be to establish the *bona fides* of the draughtsman; readers must accept our word for this.

TINEA IMBRICATA (TOKELAU) IN BENGAL

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History

THE disease was first described by Dampier in 1789. Tilbury Fox described it as 'Tokelau' ringworm in 1874, but he considered the fungus to be identical with that of the European ringworm. Manson (1879-82) in China was the first to describe the disease in any detail and he gave it the name *tinea imbricata*; he considered the fungus a non-cultivable *Trichophyton*, to which Blanchard gave the name *Trichophyton concentricum*. Castellani in Ceylon (1910-11) was the first to cultivate the fungus, and he proved it to be the causative agent by successful inoculation in human volunteers.

Geographical distribution

The home of the disease is certainly the Malay Peninsula whence it has spread to the Pacific islands, China, Java, Borneo, New Guinea and Ceylon. As far as is known there is no record of this disease occurring amongst Indians in this country. Although Castellani and Chalmers (1919) mention two cases from South India, they give no details as to the race of these patients, the locality they came from, or whether they had ever been in an endemic area for any sufficient length of time. However, one of our colleagues at the Calcutta School of Tropical Medicine, Dr. N. C. Dey, who spent some time working amongst the aboriginal hill tribes of Assam in the districts of Kamrup, Goalpara and Nowgong, is quite definite that *tinea imbricata* occurs amongst the aboriginal hill tribes there and in the adjacent Abor hills. But the disease is very rare amongst the Indian immigrants from the plains.

It would seem from the nature of the geographical distribution that the disease is spreading

(Continued from previous column)

I wish to express my thanks to Mr. P. H. Vital Rao, M.B., D.G.O., house surgeon, for drawing up notes of these cases and for other help rendered.

REFERENCE

Dougal, D. (1929). *Journ. Obstet. and Gyn. Brit. Emp.*, Vol. XXXVI, p. 245.

very slowly from its original focus to the adjacent countries.

The disease has not the wide distribution of the ordinary ringworm and only infects people who have come in close contact with sufferers, frequently or for long periods of time, because the fungus has very little, if any, saprophytic existence in nature, like the ordinary dermatophytes, the epidermophytons and the trichophytons, which grow readily on wooden bath-mats, on leather, on coir matting and even in mud and in the dung of animals; the fungus of *tinea imbricata* would not grow in any of these.

In the laboratory also the cultivation of this fungus is very difficult. The scales must be very fresh—that is, inoculated on to the medium immediately they are scraped off from the lesion.

The case reported (*see* protocol I) is a Bengali who comes from Mymensingh, a plains district of Bengal. He had never left his native district until a short time ago. He acquired the disease in childhood. The Mymensingh district is bordered by the Garo Hills and Goalpara district. The members of the hill tribe amongst whom the disease is reported to be common are constantly visiting the plains for purposes of trade, etc. It is quite possible this man acquired his infection by direct contact from the infected visitors from the hills.

Symptomatology

The disease begins usually with one or more small round or oval patches, slightly raised and very irritable. Soon a ring of flaky scales is formed. This ring increases in size and in the meantime another ring starts in the centre inside the first and so on until a very large roundish patch is formed containing several concentric rings. Manson has very aptly compared this concentric ring formation with ripples produced by a stone thrown into a pool of water. If early treatment is not given other areas become infected and several systems of concentric rings appear which overlap one another and gradually the whole body is covered with these rings.

The scales are greyish or brownish in colour, flaky and thin, resembling tissue paper. Sometimes large portions of the scales can be removed by pulling with a pair of forceps. A well advanced case may suggest the appearance of a case of exfoliative dermatitis, the patches being very diffuse and the rings discerned with difficulty.

The fungus does not affect the hair follicles and infection of the scalp has never been reported. The general health is not affected, but the patient complains of severe itching at intervals.

Diagnosis

Diagnosis is usually easy the lesion being very typical. Scraping from the patches treated with

Diagnosis is usually easy, the lesion being very the scales.

Treatment

In the early stages this is satisfactory, but when the whole body is involved it is very difficult as the lesions are very apt to recur, being reinfected from other parts of the body.

The patches should be treated twice daily with the following paint until every sign of the disease has disappeared; after this the area should be painted once daily to obviate recurrence.

R

Resorcinol	..	..	5i
Acidi acetici	..	..	5i
Tincturæ benzoini compositæ	..	..	5i

Fiat pigmentum

Culture.—The fungus of *tinea imbricata* was regarded as non-cultivable prior to 1910 when Castellani first grew it. However, Castellani (1928) holds that the primary culture is not possible on solid medium and advises primary cultivation on liquid glucose broth, followed by sub-culture on solid medium. We never had any difficulty in obtaining a primary growth on solid medium (especially on Czapeck's synthetic medium) directly from the scales, and all our attempts, including hanging-drop culture, were successful. Fresh and non-desiccated scales must be used and several tubes inoculated at the same time.

Animal and human experiments

We failed to produce the disease on guinea-pigs both by intradermal inoculation of a saline emulsion of the culture and by rubbing the culture on a scarified area.

One experiment on a human volunteer was successful. The intradermal inoculation of a saline emulsion of the culture failed to produce the disease, but by rubbing an emulsion on a scarified area on the forearm a typical lesion from which the fungus was recovered was produced (plates IX and X, figures 2), the incubation period being about ten days. After three weeks the patch was cured with the paint (*v. s.*) within four days (for further details *see* protocol IV).

Mycology

The growth of the fungus in all the common laboratory medium is faviform, that is, of the *Achorion* type. The end-organs are only arthrospores—single or in chains—and chlamydospores, intercalary and terminal. There are no fuseaux, no free conidia, and no aleurospores. The mature chlamydospores have double walls. The rate of growth, the nature of the colonies, the colour and the *duvet* formation varies with the nature of the medium and the oxygen supply

(see protocols II and III). There is so much variation in these that it is impossible to classify the species by colour variation alone in laboratory media.

Classification

Castellani created a separate genus *Endodermophyton* (Castellani, 1909), for fungi affecting the skin between the superficial and deep layers of the epidermis, such as *tinea imbricata*, and mentions four species:

End. concentricum Blanchard, 1901.

End. tropicale Castellani, 1914.

End. indicum Castellani, 1911.

End. mansonii Castellani, 1914.

Castellani admits that the growth is faviform in all the four species and this is verified by Sabouraud and Pinoy (Castellani and Chalmers, 1919). The character of the growth and the nature of the end-organs indicate that botanically this fungus belongs to the genus *Achorion* (Remak, 1845), and we cannot find sufficient grounds for the creation of a separate genus to add to the confusion already existing in the classification of the dermatophytes.

We cannot express any views regarding the species *concentricum*, or *mansonii*, as we have had no opportunity to study these two species of Castellani, but the species we have grown shows the typical characters of both the other two species of Castellani—*tropicale* and *indicum*. As the *duvet* formation and colour variation depends on the composition of the medium and can easily be controlled, we think it likely that these two latter species are one and the same. We venture to conclude that the fungus causing the disease *tinea imbricata* should be named, provisionally, *Achorion indicum* Castellani, 1911. However, we consider it possible that all four are but a single species, and if this can be proved the species must be named *Achorion concentricum* Blanchard, 1901, according to the rules of nomenclature.

Summary

Tinea imbricata, a disease not uncommon in the Malay Peninsula, has hitherto not been reported as occurring in an Indian in this country; a case is described.

It is a disease with a limited geographical distribution because the causative fungus does not appear capable of living a saprophytic existence as do other ringworm fungi. In this case the infection may have been acquired through contact with Assam hill tribesmen, amongst whom the disease is rumoured to be common.

Primary growths of the fungus from scales can be obtained on both solid and liquid media, provided the scales are fresh.

Cultural characters: The growth is faviform. End-organs—arthrospores, single or in chains. Chlamydospores—terminal or intercalary.

The faviform growth and the arthrospores as end-organs justify the inclusion of the fungus of the *tinea imbricata* in the genus *Achorion*, and a separate genus *Endodermophyton* is not necessary.

As the colour of the growth and *duvet* formation vary in the same species according to the medium in which it is grown, separation of species on these characteristics is not justified and in our opinion the fungus of *tinea imbricata* should be named *Achorion concentricum* Blanchard, 1909, until further investigation justifies differentiation.

Protocol I

CASE

A. G., MOHAMMEDAN male, 20, resident of Mymensingh, a plains district of Bengal; gives a history of infection from childhood. He had never been in any hill district, nor outside Bengal.

When he first presented himself in the skin clinic he was thought to be a case of exfoliative dermatitis affecting the whole body except the scalp, the palms of the hands and the soles of the feet. The scales were very thin, tissue-paper-like and exfoliating. On pulling the free margins long pieces could be drawn out. Careful examination showed the lesions to be arranged in concentric rings, this was especially distinct over the back, sides of the chest and upper part of the abdomen. The rings were of a brown colour; very fine, raised and gyrate. On some areas, namely the arms, forearms, thighs and legs, the eruption appeared as a diffuse scaly dermatitis the circular arrangement being practically impossible to make out. Exfoliation was abundant and the scales were easily scraped off with a blunt scalpel.

Scrapings.—Scales show mycelia in abundance, septate and interlacing freely. No free conidia were seen.

Culture.—Positive both in solid and liquid media.

Character.—Faviform; growth brownish (in Sabouraud's maltose peptone media) covered with white powdery surface. Colour varied according to various media and different oxygen supply. Grows aerobically, anaerobically, or under partial aerobic conditions.

End-organs.—Arthrospores in chains, chlamydospores, both intercalary and terminal, no free conidia seen.

Biochemical reaction.—Not hæmolytic. Slightly proteolytic in serum. Does not ferment sugars.

Animal experiments.—Not successful.

Human inoculation.—Successful.

DESCRIPTION OF PLATE IX.

Fig. 1.—Painting of skin of case described.

Fig. 2.—Painting of skin of infected volunteer (Ramu).

Figs. 3 to 10.—Growth of organism on different media.

Fig. 3.—Glucose broth.

Fig. 4.—Synthetic viscid medium.

Fig. 5.—Glucose agar with rubber cap.

Fig. 6.—Synthetic solid medium.

Fig. 7.—Anaerobic growth.

Fig. 8.—Sub-culture from synthetic solid.

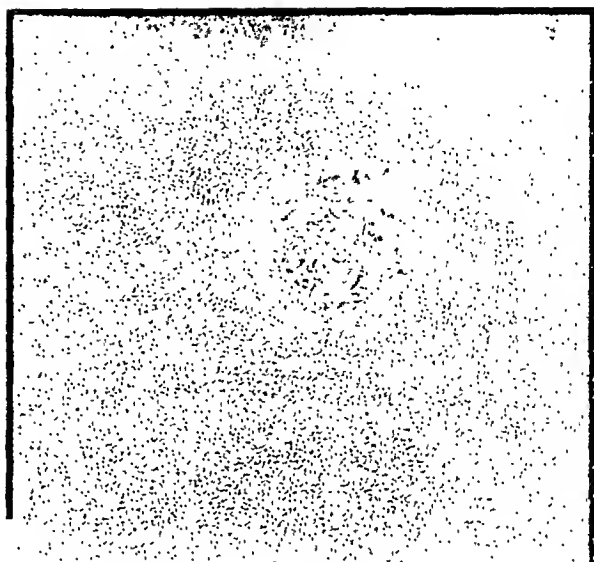
Fig. 9.—Sabouraud's medium.

Fig. 10.—Scales stained showing mycelia.

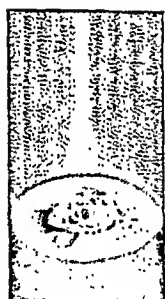
PLATE IX.



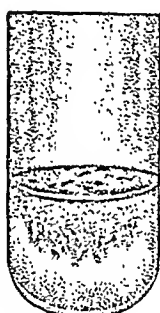
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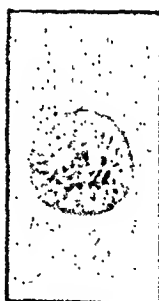
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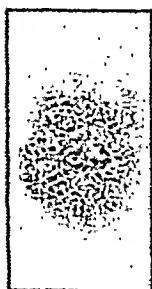
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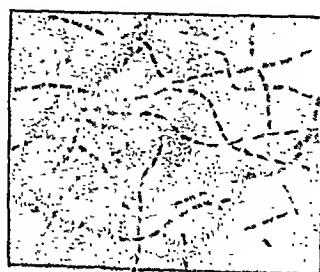
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10



Fig. 1



Fig. 2

DESCRIPTION OF PLATE X.

- Fig. 1.—*Tinea imbricata*—the case reported.
 Fig. 2.—The lesion induced by inoculation in a volunteer.
 Fig. 3.—Photomicrographs of a hanging-drop culture direct from scale in synthetic Czapeck's medium showing the end-organs—the arthrospores and chlamydo spores. (Four weeks' growth.) (a) Low power; (b) high power.
 Fig. 4a.—Micro-drawing of a fifth-week culture in glucose broth showing chlamydo spores with double walls.
 Fig. 4b.—Micro-drawing of a fourth-week culture showing arthrospores in chains.

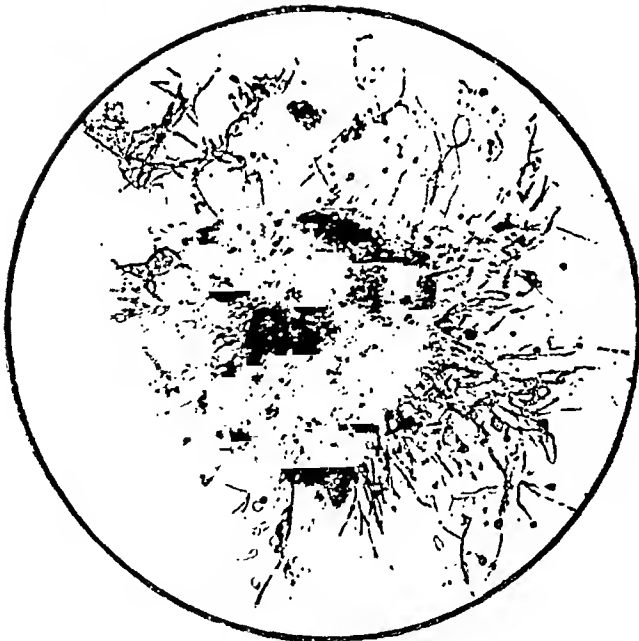


Fig. 3a

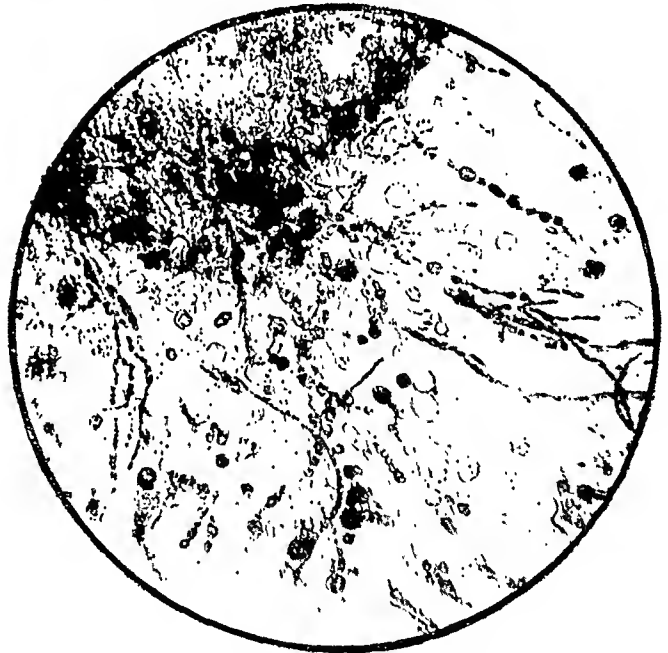


Fig. 3b

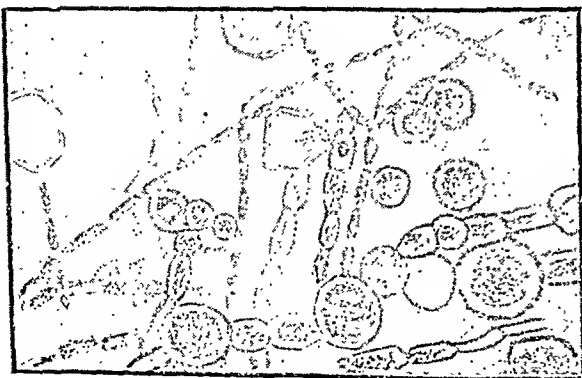


Fig. 4a

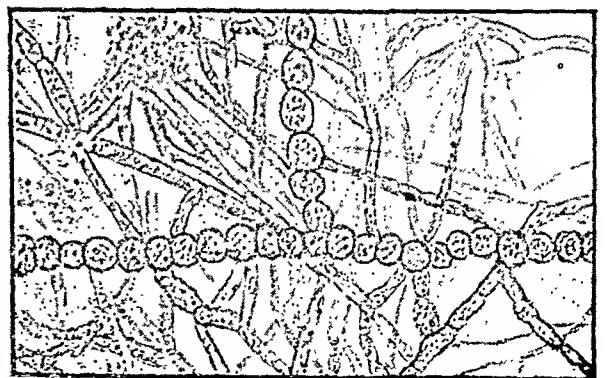


Fig. 4b

Protocol II

Culture medium	1st week	2nd week	3rd week	4th week	5th week
1. Sabouraud's maltose peptone agar.	Very slight growth, white downy, 4 mm. diam.	Growth very slow, white, about 6 mm. diam.	Achorian-like growth, dirty brown, raised cerebriform in the centre and white-powdery over the surface. About 7-8 mm. diam.	Achorian-like growth, dirty brown, raised cerebriform. White-powdery surface. Margins—no radiations. End-organs—no free conidia, no arthrospores, only chlamydo-spores.	Like 4th week. Achorian-like growth, dirty brown, very slow—surface powdery, roots not seen. End-organs—chlamydo-spores, intercalary and terminal (plate IX, figure 9).
2. Synthetic (Czapeck's) solid.	Very slight white downy growth radiating from centre about 6 mm.	Very slow growth, white smooth about 1 cm. One sub-culture made in same medium (plate IX, figure 6).	Primary growth smooth colourless, growth 1 cm. in diam., thick downy roots, sub-culture same type of growth.	Primary—smooth, colourless growth, little over 1 cm.—very slow, radiating from the centre of the scale. Thick woolly roots growing deep down. Sub-culture—same type of growth.	Primary—smooth colourless growth radiating from the scale—fluff with the surface of the media—roots thick cotton-plug-like (plate IX, figure 8). Sub-culture—growth slow like the primary culture. End-organs—chlamydo-spores—in chains (intercalary and terminal).
3. Synthetic (Czapeck's) viscoid. Agar 0.2 per cent.	Very slight.	Very slight growth, roots woolly; in abundance.	Slow growth; muffy white roots all round.	White woolly growth from all sides of the scales, some floating on surface, some in the middle of media, some sticking to the sides.	Like that of 4th week. Fine segmented mycelium. End-organs—chlamydo-spores both intercalary and terminal (plate IX, figure 4).
4. Synthetic (Czapeck's) liquid.	Growth not perceptible.	Growth hardly perceptible.	Very little growth, only one scale looks like a tiny little shining spot radiating from the centre, which is scale.	Growth fair this week, flaky or woolly growth lying at the bottom and floats on shaking, many colonies.	Growth like that of powder-juff. End-organs in plenty. (plate X, figure 3), chlamydo-spores in chains (arthrospores), the terminal spores are big and have double septa.
5. Whey agar.	Growth not perceptible.	Very slight.	Growth very slow, and smooth.	Very slow growth like Sab. (1), colour dirty brown or sand; achorian-like raised.	Achorian-like growth, dirty brown or sand; powdery surface like that on glucose agar; End-organs—chlamydo-spores.
6. Glucose agar.	Slight growth.	Growth like Sabouraud's (1), but very slow.	Achorian-like growth, dirty brown, raised and cerebriform with white-powdery surface, downy margins.	Raised, rough cerebriform growth like achorian—growth fair, colour dirty brown covered with white powder.	Raised cerebriform, like achorian, surface powdery. End-organs—chlamydo-spores. Colour—dirty brown covered with white powder.
7. Glycerine agar.	Not perceptible.	Very slight.	Very slow growth, white smooth colonies.	Growth very slow, sand colour; smooth with colourless radiating margins.	Very slight growth, like 4th week. Sand colour; margins almost colourless radiating.
8. Saccharose agar.	Do.	Very slow, white and smooth.	Very slow like glycerine agar.	Growth very slow, small sand coloured colony, snuff-colour powdery.	Growth like that of 4th week.
9. Glucose broth.	Do.	Small flaky mass, floats on shaking.	Small flaky mass about 4 mm. diam., floats on shaking.	White woolly flaky growth, floats on shaking. Photomicrographs show terminal and intercalary chlamydo-spores in chains (arthrospores).	Woolly, like powder-puff. About 5 mm. diam., floats on shaking (plate IX, figure 3). Arthrospores in chains.

Protocol III

	Medium	Conditions	Growths
10 11	Sabouraud's medium } Synthetic medium }	Complete anaerobiasis.	More downy surface. Colour—grey, with beaded appearance (plate IX, figure 7).
12	Sabouraud's (sub-culture).	Partial anaerobic condition.	Less pigmentation; white radiating surface runners; less downy and less cerebriform; colony smooth.
13	Glucose agar with rubber cap.	Oxygen tension constant.	Colour—salmon pink; usual growth (plate IX, figure 5).
14	Sugars.	....	None fermented in fifteen days.
15	Serum.	....	Liquefied slowly.

Protocol IV

ANIMAL AND HUMAN EXPERIMENTS

(a) Guinea-pig no. 1 was given an intradermal injection of saline emulsion of a culture on a shaved area on the back.

Result:—1st week—slight swelling.
2nd week—swelling still present.
3rd week—swelling subsiding.
4th week—no swelling.

(b) Guinea-pig no. 2 was inoculated by superficial scratching (vaccination method) on the shaved skin of the shoulder, dressed with saline gauze and strapped.

Result:—1st week—slight swelling, area raised about 1 cm. in diam.
2nd week—area smooth, no hairs grown as yet.
3rd week—condition the same.
4th week—hairs growing, no infection.

(c) Ramu—intradermal injection of saline emulsion. Left forearm in front—slight swelling.

Result:—1st week—swelling still present.
2nd week—no swelling, no infection.

(d) Ramu—inoculation by rubbing the culture on the back of right forearm (vaccination method).

Result:—1st week—slight swelling.
2nd week—swelling still present.
3rd week—distinct rings appeared with swelling of the part (plates IX and X, figures 2); mycelia found in the scales and recovered by culture.

REFERENCES

- Castellani, A. (1928). *Fungi and Fungous Diseases*.* *Arch. Dermat. and Syph.*, Vol. XVII, p. 354.
Castellani, A., and Chalmers, A. J. (1919). *Manual of Tropical Medicine*. Baillière, Tindall and Cox, London.

HOT WEATHER EAR—A CLINICAL ENTITY*

By F. J. PALMER, F.R.C.S.I.

LIEUTENANT-COLONEL, R.A.M.C. (Retd.)
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THE writer first made the acquaintance of this condition shortly after first landing in India. He was then stationed in Meerut, a very hot station, where the soldiers made free use of the swimming baths in cantonments. There were several admissions to hospital with a condition which was diagnosed in accordance with the nomenclature of diseases as 'Inflammation of the external auditory meatus'. The condition was generally attributed to contaminated bath water entering the meatus and setting up inflammation there. A medical officer of experience, I think belonging to the Indian Medical Service, informed me that he had seen the condition in Bombay where he had heard it called 'monsoon ear'.

The treatment consisted in syringing with antiseptic lotions, and as far as I can remember after the lapse of years, was not brilliantly successful in all cases.

Subsequently I came across several cases of this affection in a company of soldiers who had been engaged in musketry practice rather later in the season than usual; but whether the infection—which one inferred—was dust-borne or water-borne is not quite certain. I was rather inclined to believe this affection to be really a ringworm of the external meatus.

The following is a brief description of a typical case of the disease:—A medical man is generally first consulted because of pain in the ear, sometimes slight in early cases, and often agonizing in later ones. On inspection the

* Being a paper read at the Annual General Meeting, Assam Branch, British Medical Association, 1934.

* Other references will be found in this paper.

meatus is found more-or-less blocked by a swelling of its walls. In a marked case this swelling almost completely blocks the channel, and any attempt to introduce an auriscope to see what is the condition causes such pain that it has to be abandoned. In a case where the swelling is less marked, a portion of the drum can sometimes be seen through a chink formed of the swollen lining of the meatus which is red and inflamed, and from which hang tatters of dead white skin. In cases where the meatus has been patent from the first, or becomes so later, after syringing such fragments of dead skin may come away in what seems to be an annular skin cast of the meatus.

In some cases the tympanum is covered by a purulent-looking membrane, almost exactly simulating a perforation with pus overlying the remains of the drum. I have several times in such cases, after a course of treatment, seen a blue absolutely healthy and intact tympanum emerge when the membranous shroud had disintegrated.

I can still recollect quite clearly the indignation of a London ear specialist who was examining cases in the hospital of which I had charge in Mesopotamia, and who had asked me to look at a case of what he considered bad perforation, when I replied 'I am not quite certain, I shall tell you after I have treated him for a week'. At the end of that time I was able to show him an intact drum appearing, and to explain why I had hesitated to accept his diagnosis.

The condition is usually unilateral, but it is fairly common in such cases to find the same inflammatory process existent to a lesser extent in the opposite ear.

The cases in which the meatus is not completely blocked respond to antiseptic syringing and slowly improve.

In the cases in which blockage of the meatus is complete, syringing is of no avail. It never gets round the corner where the trouble is. Such cases, after a spell of severe pain, often exude a little watery semi-purulent fluid and the swelling slowly subsides and the pain disappears. They are then usually diagnosed as boils of the meatus.

The method of treatment that I have evolved, after some experience of these cases, gives quick relief in even the most marked of them. The cardinal point in treatment to remember is that, to be successful, the medicament must be applied to the affected inner portion of the meatus beyond the obstruction.

The following may be used in treatment :

(1) *Glycerine* one drachm, to which one small drop of sanitol is added and thoroughly mixed up. If this seems to cause undue irritation, the amount of glycerine may be increased.

It is probable that other varieties of cresol would prove equally efficacious, and years ago when I saw most of these cases, I used any kind

of cresol which came to hand. It must be remembered, however, that these vary much in the amount of irritation which they are capable of causing, and the dilution of cresol may have to be increased in such cases.

(2) *Ichthyol and glycerine*, equal parts, or if this mixture is not sufficiently liquid in cases where the meatus is tightly blocked, one part of ichthyol to two of glycerine.

These medicaments are introduced in the following manner :—The patient lies upon his side with the affected ear uppermost, and the meatus is filled with the medicaments. A no. 2 or 3 Jacques rubber catheter is then taken, and, held very lightly, is worked up and down past the obstruction, with the greatest gentleness, carrying with it the application to the place where it is wanted.

Used in this way, by anyone endowed with good tactile sensibility, there is not the slightest danger of damaging the tympanum. A careful estimation is of course made of the depth to which safe penetration may possibly be made.

Owing to the small size of the instrument used, the application does not, as a rule, cause severe pain. Should it do so, a strong solution of cocaine, as used for mucous membranes, may be first applied, but such is seldom necessary. This manœuvre should be carried out twice daily.

This treatment is rapidly followed by a lessening of the pain, and it must be remembered that, in some of these cases, the pain is extremely severe.

Whilst the medicament is taking effect, pain may be relieved by hot fomentations. It was formerly my custom to give opium in cases with severe pain. This should now be unnecessary, and I would use Compral or Novalgin instead.

The effect of this treatment is, firstly, relief of pain. Some days later the swelling decreases, and a little later an auriscope can be introduced, and an estimation of the condition made. As soon as the meatus is sufficiently open, syringing can be commenced. I generally use the cresols in weak solution, but eusol may be alternated. In the returned lotion may often be found the skin flakes so characteristic of the disease.

Treatment must be continued for weeks, until with the auriscope no flakes are seen, and the tympanum and the lining of the inner half of the meatus appear normal.

Though I have called the condition 'hot weather ear', as most of the cases I have seen occurred during that time, one of the two cases I have seen in Europeans since I have been in Assam occurred during the cold weather.

My own impression is, that the condition is most probably a ringworm, with or without a superadded, secondary, probably bacillary, infection; but I have been unable to demonstrate

(Continued at foot of next page)

'BACKDOOR DRAINAGE', AN ANTI-MALARIAL MEASURE DESIGNED TO MEET A PARTICULAR PHYSIOGRAPHICAL SITUATION IN SYLHET DISTRICT, ASSAM

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Physiography of Sancherra garden

A RIVER has a regimen like that of a pendulum; in its course it oscillates from side to side, and the consequence is that it moves in a series of curves, these having an amplitude depending on the gradient and a wave-length depending on the width of the river. The phenomenon however is influenced in its manifestations by such static factors as the heterogeneity of the earth—for instance if the banks of a stream that would naturally swing in curves be rigidly protected it is compelled to follow a straight course—or it is biased by such a dynamic matter as the deposition of alluvium by another stream approaching it—and so when one observes that two streams pursue independent courses for some distance down a valley plain, one may be sure that the oscillation of each has been biased by the resistance offered by the alluviation of the other, the resultant course of the streams being the state of equilibrium between the apposing forces.*

An example on a grand scale of the influence of a stream on the course of a second one, even when the latter is the greater of the two, is seen in the Ganges Valley, where the great river has been for various reasons pushed over to the south against the peninsula by the deposits of its tributaries the Gogra, Gandak, and others; while on a small scale such factors doubtless have determined the courses of the Dholoi River and the Legata River in the Dholoi Valley of South Sylhet, the scene of this report, the two rivers running down the valley independently for some distance before joining (see map 1).

Now not only do two apposing streams influence the oscillation of each other, but the

result may even proceed to the length of the larger stream choking, as it were, the smaller; if this indeed cannot escape elsewhere, for it stands to reason that if the alluviation of a stream be powerful enough to influence another in its course, the deposit may go so far as to invade the latter grossly, the first effect of the choking of the lesser stream* by the deposition of silt in its bed being that the stream is raised, thus reducing the gradient of its course behind the obstruction. Consequently the stream swings more from side to side and its valley is thereby further widened by erosion: while it more readily overflows its banks, and a permanent swamp, or even a broad expanse of water may be the result. The stream at the obstruction meanwhile becomes more exiguous as it is choked by the deposit, so that the outflow from the lake or swamp that may have been formed behind it becomes a mere trickle, and indeed if the outflow be no more than can get away by percolating through the barrier of silt it entirely disappears underground.

Such a strangulation of a stream emerging from a valley in the hills, and the physical consequences as described above, were observed by us in 1923† in the Sancherra garden of the Ali-nugger Tea Company in the Dholoi Valley of Sylhet in Assam. Here the 'lines' of the tea-garden labourers had been built on a spur of hilly ground to the south of a shallow *bhil*, or lake, which had originated in the way described and been deepened by the local fishermen who had erected a bund for this purpose. The valley in which the *bhil* was confined had been naturally widened by the swinging of the stream in its attempt to escape from the obstruction at its mouth and the area provided a sump for the local rainfall, from which at the height of the rains there was only a very exiguous outlet, or spill (see map 2); over higher ground‡ to the west, a high bank of alluvium deposited by the Sancherra River (see levels in map 2 and figure 1): while during the drier months the only outlet for the lake was by percolation through this bank of deposit. The *bhil* was shallow, covered with aquatic plants, and bred innumerable mosquitoes, of which *Anopheles funestus* (*minimus*), *aconitus* and *philippinensis* may be mentioned.

(Continued from previous page)

any fungous elements, possibly owing to defective technique.

The exfoliation of the epithelial lining definitely suggests ringworm, but on the other hand, the treatment used may increase this.

I believe that a certain proportion of the cases diagnosed as furunculosis of the meatus belong to this category.

* Actual junction of two streams will be effected if the bigger stream when swinging can overcome the resistance due to deposition of alluvium by the other.

Malaria in Sancherra garden

In 1923 the spleen-indices were as follows:—

'Lines'	Spleen-index
East	58.8
Bazar	52.5

* The choking may even completely block up the mouth of a tributary valley.

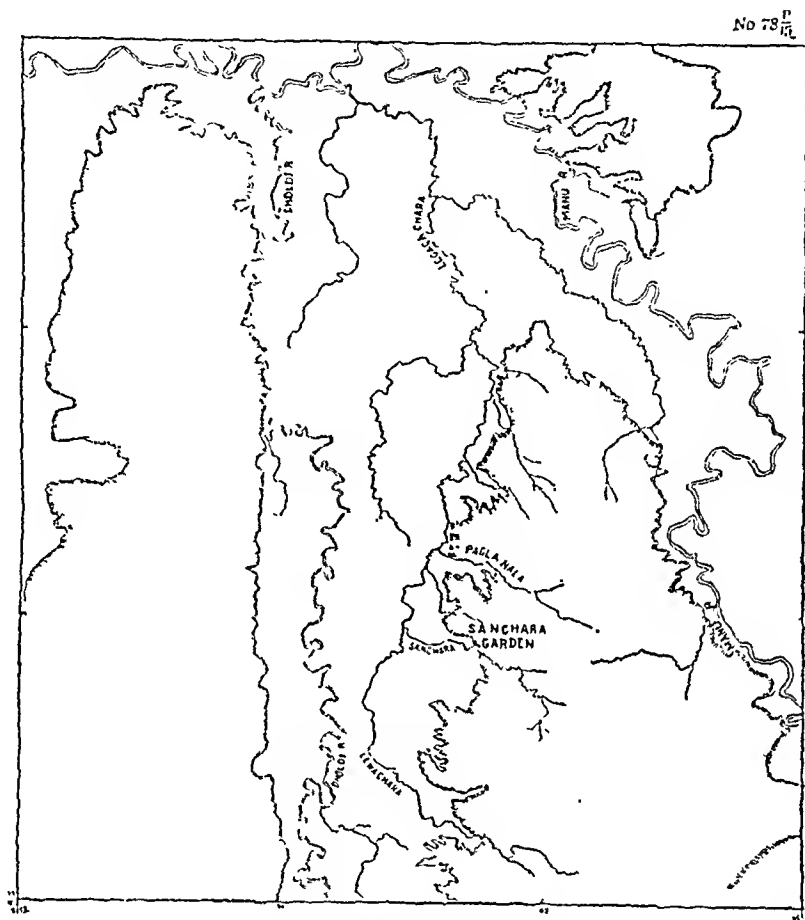
† When one of us (C. S.) surveyed this garden in connection with a general malaria survey of the Assam Tea Estates.

‡ A very common phenomenon in South Sylhet.

In 1926 Messrs. Duncan Brothers of Calcutta accepted a scheme for the amplification of the survey of 1923 and allowed us to organize some anti-malarial work on this garden with others in their agency, to see whether measures based on the findings of the survey would be effective.

with it. Careful consideration of the sequence of events resulting in the formation of the *bhil* indicated that its artificial drainage by cutting through the bank of silt obstructing the outflow was not feasible, as more silt from the original source would immediately dominate the drain

MAP 1



The Dholoi River Valley (taken from the Survey of India sheet, 1 mile to the inch scale).

As it had been concluded that the *bhil* was an undesirable feature in the malariageny of the place, discussion arose as to what to do

and fill it up. It would be comparable to expecting a prick in the skin to remain open. Among various alternatives it was ultimately



Fig. 1.—A high bank of alluvium deposited by the Sancherra River planted with paddy.



Fig. 2.—A *kunji*, an exiguous valley the bed of which has been levelled off by years of paddy planting.

indeed possible that on taking levels the northern route would be found to be unsuitable and the southern suitable.

The following were the relative levels at important points. The average water-level in the *bhil* was 31.40 feet* with soundings of the bottom everywhere of less than 3 feet. The levels taken along the *kunji*† to the north into which the cutting was to be made were 40.40 feet; 35.30 feet; 31.30 feet; 30.60 feet; 27.20 feet; and at the Hagricherra they were 20.00 feet (average water-level) and 16.70 feet at the bed of the stream. There was therefore ample fall from the *bhil* bed the lowest point of which was 28.80 feet, to the *kunji*, but between these



Fig. 3—The cutting looking east toward the *bhil*, in 1930

two points the bank of the tea garden, on which tea was being grown and which would have to be cut through, rose to 43.10 feet at the datum level. In the end the necessary cutting‡ through this bank was made down to the 28 feet level, so that the deepest part of the cutting was about 15 feet (figures 3 and 4) and it was continued as a drain along the eastern edge of the *kunji* to the north to the 27.20 level, from which point the drainage was to run away over the general surface of the land, see Section for diagrammatic section of work.

*The datum utilized was 43.10 feet shown at X on map 2. It corresponded approximately with the 123.10 feet contour in the Survey of India maps

†Exiguous valley, the bed of which has been levelled off by years of paddy planting (see figure 2). This *kunji* is to be called the Johnstone *kunji*.

‡Named the Wilson Cutting.

Physical results

The effect of this earthwork was to dry up almost completely the great expanse of water in the *bhil* (figures 5 and 6). Mr. Aitken's and



Fig. 4—The same as figure 3, in 1934, well settled and now overgrown with jungle to support the sides and prevent anopheline breeding



Fig. 5.—The *bhil* near the cutting before completion; water at the cold-weather level: the line of bushes delimits the rains level.

Mr. Wilson's notes on results are appended. A few depressions remained, but the garden labourers filled most of them in and levelled them off for the purposes of paddy cultivation (figures 7, 8 and 9). No deleterious effects on the Hagricherra have since been noted. A



Fig. 6.—The same as figure 5 after draining off the *bhil*: the 'nullah' was formed by the flow-off and has since been levelled away.

side-issue however has been that the ryots on the lands adjoining the *bhil* have entered a protest against their loss of fishing-'rights' on the estate land.



Fig. 7.—The bed of the *bhil* levelled up and planted with paddy.

The levels on the bed of the *bhil* after the main work was completed are shown in the map, the lowest point as already stated being 28.80, not too low for drainage through the cutting, but too low for rapid drainage. This and other such places have therefore been filled in, and further to facilitate drainage a contour-drain graded from 29.30 to the cutting at 28

feet has been dug on the western side of the *bhil* (figure 9).

Results to health

As for the result to the malaria endemicity, this as stated above was noted by one of us

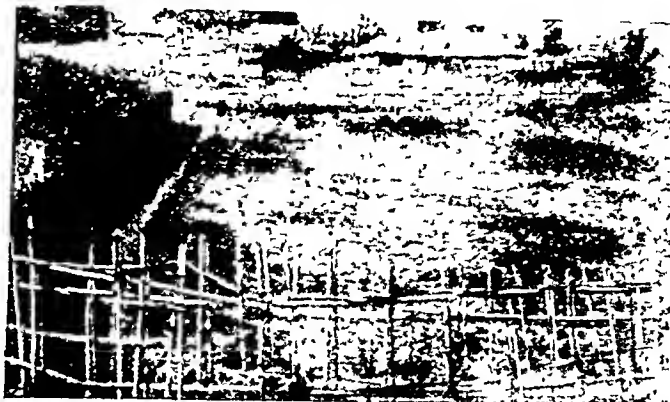


Fig. 8.—The southernmost arm of the *bhil* below the bazar cooly lines: a contour-drain protects it, as seen on the left.



Fig. 9.—The arm of the *bhil*, at the apex of which the cutting was made: the contour-drain on the left is shown on map 2, on the west of the *bhil*.

(C. S.) in 1923 and has been recently taken again by him in 1934 as follows:—

'Lines'	East	Bazar	South	TOTAL
1923	58.8	52.5	..	..
1934	25.71	11.62	17.24	17.75

It is not within our purpose to discuss here the causes of the residual endemicity.

Conclusion

The lessons to be learnt from these observations are:—

(1) That it is essential to understand what Nature is doing, otherwise one may be tempted into measures opposed to her infinitely greater power: thus the common practice of the 'straightening out of rivers' by cutting by-passes is folly, because, as explained above, rivers are curved in their courses in obedience to dynamic laws:

(2) That in areas of great alluvial deposition one may commonly find big streams not

only influencing the course of lesser streams but actually blocking them with silt so that they cease to exist above ground and swamps and lakes are formed behind the obstruction:

(3) That on no account should open drainage through recent alluvium be resorted to, but such areas of deterioration may perhaps be drained out by the 'backdoor method', thus defeating Nature by a stratagem:

(4) This 'backdoor' drainage is very often impracticable, as a cutting to an active stream at a suitable level would be too costly:

(5) That Man, represented in this case by tea-garden labourers, may be, though unintentionally, an important factor in altering the physical features of the surface of the land by filling in depressions for the purpose of planting paddy.

Acknowledgments

We are indebted to Messrs. Duncan Brothers and Company in the first instance for their kindly placing this estate at our disposal for the conduct of this sanitary experiment, and, as for the executive work, we have received a great deal of assistance from Mr. H. Aitken, the consulting engineer, who after confirming the survey levels concurred in the scheme, Mr. John Forbes, general manager of the Ali-nugger Tea Company gardens, whose influence was a great inspiration for success, Mr. Wilson, the manager of the Sancherra garden, who discovered the best line for drainage and carried out the main scheme, for which reason we would like the big cutting to be named the Wilson Cutting, and finally Mr. Johnstone, who more lately has taken out the levels again to enable us to see what changes there have been.

We would also wish to thank our assistant Dr. Paul for his careful malariological data enabling us to control the scheme.

APPENDIX

Details of executive work, and cost supplied by Mr. Wilson.

WORK			
Total length of cutting through bank and the <i>kunji</i> on the north	690 ft.		
of which the cutting through bank may be taken to be	350 ft.		
and the outlet drain	340 ft.		
Cutting—			
greatest depth	15 10 ft.		
greatest width at top	15 ft.		
greatest width at bottom	3 ft.		
Outlet drain—			
width	3½ ft.		
depth	1½ ft.		
Inlet contour-drain (on west of <i>bhil</i>)—			
length	1,320 ft.		
width	1½ ft.		
depth	2 ft.		

A day's rainfall of 3.52 inches took 18 hours to drain off.

(Continued at foot of next column)

ANTI-MALARIAL WORK ON A GROUP OF TEA ESTATES IN SOUTH SYLHET

By R. A. MURPHY, L.R.C.S.I., L.R.C.P.I., L.M.

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THE anti-malarial work here reported upon was initiated in 1926 under the auspices of Messrs. Duncan Brothers of Calcutta, the agents for three of the tea gardens in the group of which I was in medical charge. Later on, other companies decided to adopt the same measures, so that in the end the estates of the Amo, Deundi, Chandpore, Teliapara, Luskerpore, and the Imperial Tea Companies were included in the scheme of work, the results of which are reported below.

In 1926 practically no anti-malarial work had been attempted in the tea districts in India, so that the scheme—which was based mainly on the findings of Dr. C. Strickland of the Calcutta School of Tropical Medicine during an extensive malarial survey of the tea districts in 1922 and 1923 and was carried out in collaboration with him—was really an experiment in sanitation.

The results of the initial work in the gardens of Messrs. Duncan Brothers' agency have been

(Continued from previous column)

Cost

The capital cost of the executive work for 1930-31 was as follows:—

	Rs.	As.	P.
1930. The big cutting cost ..	347	4	6
Infilling depressions ..	149	7	9
	496	12	3
1931. Contour-drain dug round <i>bhil</i> , big cutting deepened ..	60	0	0
Infilling holes ..	160	0	0
GRAND TOTAL 1930-31 ..	716	12	3

APPENDIX

Note by Mr. H. Aitken, Consulting Engineer to Messrs. Duncan Brothers and Co., on the executive work, dated 29th March, 1934:—

I inspect the *bhil* annually and can assure you the works are a complete success.

I take this opportunity of letting you know, in connection with contour seepage drains round the foot of *tillahs*, that during the past three cold weathers I have had miles of these drains cut and existing ones deepened resulting in most effective drainage in low narrow *kunjis* under tea cultivation, most profitable work.

Note by Mr. Wilson, 23rd August, 1933:—

What was previously waste *bhil* land is now excellent *khet* land while outside our boundary a greater area is being cultivated by *bustee* people.

To the garden coolies every acre under cultivation means anything from Rs. 100 to 175 per annum, and this for a capital cost to the garden of about Rs. 100 an acre, plus a little for necessary upkeep.....

(Sd.) D WILSON.

lately reported upon by Dr. Strickland and myself (1932).

The operations were particularly difficult because of the nature of the terrain; this is dominated by alluvial deposits obstructive to drainage on the estates, which lie on the low hills bordering the flood plains. However, various means have been adopted to overcome the difficulty, and two new methods in anti-malarial work have been evolved, one '*bhil-silting*', the other '*backdoor drainage*'.*

In the earlier work the problem was to deal with the extensive anopheles-breeding marshes or *bhils*. These *bhils* on the gardens originally joining the scheme have for the most part been rendered innocuous by *bhil-silting*, but the numerous highly-dangerous drains remain to be treated. Thick shading of drains is essential, and it is unfortunately more difficult to start and maintain this growth of vegetation than to make the drains, as it requires more supervision and generally has to be done at a more inconvenient season of the year. Cattle do much damage to drains, but even more to the growth of shading, and the only satisfactory solution is to fence them off.

Further progress now depends almost entirely on this drain shading, and this will have to be undertaken intensively.

The mosquito catchers visit each garden approximately once a month, and the assistant, Dr. Chakravarty, after examination of the captures, sends to the manager a report regarding the dangerous species and where they have been found. This enables the managers to know exactly what place requires attention, and they are now aware of what steps to take to right matters, unless the conditions are exceptional.

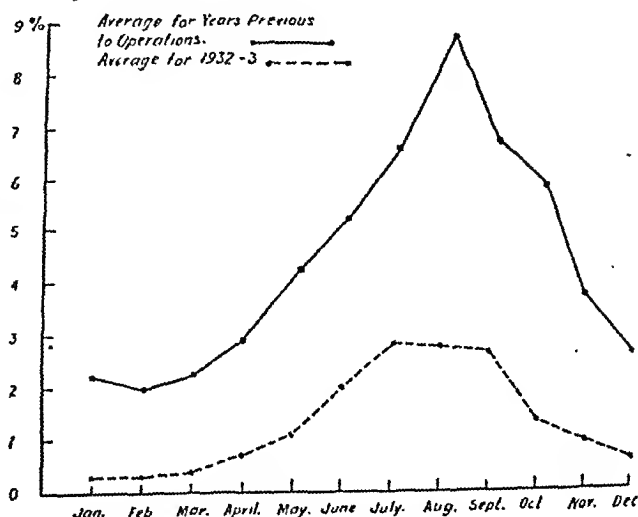
Tanks were oiled periodically.

The maintenance of drains requires constant supervision, and where there is a tea-house assistant it is a good arrangement to put him in charge of them. It is work that he is not tied down to do at a definite time, and that can be done as opportunity offers. It interests him, being a change from factory routine, and allows of fresh air and exercise.

The effect of the anti-malarial measures on the health of the labour forces.—On the whole the results to health have been very satisfactory. The case of garden B, where the August sickness rate has dropped from 19.6 per cent to 2.5 per cent, may be claimed as fairly typical of the results obtained, but apart from such figures the managers affirm that the working capacity of the coolies has enormously improved.

The population on any one tea estate, or even group of estates, is too small to enable definite conclusions to be drawn from vital statistics covering only short periods, except in the case of gross variations or exceptional circumstances. A favourable infant death rate in any year, for instance, may be spoilt by the unavoidable deaths of a pair of premature twins. All diseases fluctuate naturally in their incidence over varying periods. In this report therefore the figures for several years have been grouped together, so that a truer perspective may be obtained. The tables and graph show the figures for malarial incidence and infant deaths before and after the scheme was instituted. The graph illustrates the drop in malaria cases better than does the table, as the latter takes no account of the increase in population, which has risen from 14,398 in 1929 to 17,656 in 1933, so that the drop in cases from 6,596 to 2,101 is more significant than at first it appears to be. Further this additional labour has been largely recruited from Tipperah gardens and from the local *bastis* and the disease thus imported tends to lower the general health, also, as is well known, immigrants may intensify malaria.

Infant-mortality rates are given, as, although a non-malarial garden may from one or other cause have a high rate, a badly malarious garden will never have a low one. Most of the infant death rates are very good and prove the control of malaria. The garden with the highest rate has only recently joined the scheme, and already there is an improvement, which as work progresses is certain to continue. The coolie infant enjoys the advantages of natural feeding and sunlight, and, were malaria to be eliminated, the death rate here should be very low.



In 1933 the percentage of cases as a whole showed little change from the previous year. A substantial decrease would have been shown had there not been an unusually large number of

(Continued at foot of opposite page)

* This is described in another article in this issue.—
EDITOR, I. M. G.

A FORM OF GENERALIZED OEDEMA ATTENDED WITH MALNUTRITION WHICH IS BECOMING INCREASINGLY COMMON IN RANGOON

By M. L. KUNDU, M.B. (Cal.), F.R.F.P.S. (Glas.),
L.M. (Dub.)

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DURING the last two and a half years that I have been posted in Rangoon, a peculiar disease,

(Continued from previous page)

cases in the latter half of October and November, a time when malaria here is usually becoming quiescent. This, it may be surmised, was due to exceptional climatic conditions, but owing to lack of facilities, it is not possible to define these. The meteorological records available are of little value for scientific purposes as temperatures taken with thermometers hung on bungalow walls are subject to many errors.

Gardens	MEAN ANNUAL MALARIA CASE INCIDENCE		INFANT DEATHS PER 1,000 BIRTHS	
	† Years previous to operations	For 1931-32-33	Average 1924-27	Average 1928-33
A	1,376	505	101	67
B	1,284	172	148	82
C	768	159	295	125
D	409	222	98	53
E	663	108	212	65
F	603	202	98	43
G	494	193	78	75
H	254	238	101	95
I	755	302 *	175 †	136 *
	6,596	2,101		

Population, 1929 14,398
" 1933 17,656

* 1932-33, since joining the scheme.

† 1924-31.

‡ From 3 and 6 years, as records were available.

In spite of the scheme having been handicapped by the financial stringency, and in some cases by difficulties in supervision due to attenuated staffs, considerable success has been attained, and if further work is now carried on energetically the loss due to malaria should after a few more years be trivial.

My thanks are due to Dr. Strickland of the Calcutta School of Tropical Medicine for his collaboration in the initiation of the scheme and for his continued interest and advice during its development.

REFERENCE

Strickland, C., and Murphy, R. A. (1932). River-sand Silting and other Anti-malarial Measures in South Sylhet, Assam. *Records Malaria Survey India*, Vol. III, p. 125.

apparently of the deficiency group, characterized by a rapidly progressive general anasarca, moderate anaemia, normal or increased urinary output, and malnutrition, has come under my observation more frequently than when I was in this city fourteen years ago. The disease differs from the type of beri-beri which is prevalent in Burma, and also from epidemic dropsy, which occurs almost exclusively amongst the Bengalee residents of the city and which is clinically a different entity from beri-beri, though many authorities presume that it is only another manifestation of this disease. It may be similar to cases of famine dropsy or war oedema, described by Sir John Megaw (1930), as, undoubtedly, on account of the increasing trade depression in this city, there are large numbers of the labouring class people who are unemployed and who have to subsist on a diet verging on starvation. However, the price of rice being very favourable, a sufficient quantity of food can easily be made up for a few pice with white rice and leafy vegetables; it is the quality of the food of all the patients that came under my observation that was at fault; it was ascertained by questioning them that their diets were particularly poor in fat, and articles rich in vitamin B.

The cases suggest chronic glomerulo-tubular nephritis, but it soon becomes apparent that there is hardly any cardiovascular change; the blood pressure is low or normal, and the urine is not scanty, and contains neither albumen nor casts. They have none of the symptoms of either beri-beri or epidemic dropsy, and with rest, a diet of milk, eggs, germinating pulses and red rice or good bread, and with only a little iron and aperients by way of medicine, they improve fairly rapidly, except in cases where the oedema is of long standing and the skin has become hardened with continued waterlogging; in these cases hypodermic injections of strychnine seem to be of great value.

The following cases are typical of the disease; and a brief description of their condition and result of clinical investigation will give a better idea of this ailment:

Case 1.—N., Hindu male, aged 40, gardener by occupation, was admitted in Rangoon General Hospital on 31st January, 1933, for treatment of anaemia and general anasarca of 10 months' duration. He had been mostly out of employment and often had to subsist on charity. Two months ago he was admitted into hospital once and was treated for ancylostomiasis and discharged relieved. He had to return very soon as he quickly deteriorated for want of proper nourishment.

Examination of blood on 2nd February:—Total white blood cells—5,400 per cubic millimetre; total red blood cells—3,930,000 per cubic millimetre; haemoglobin—55 per cent.

Urine—nothing abnormal; stools—no ova, no protozoa, no cellular exudate.

Blood pressure—120/75; Wassermann reaction—negative.

Chloride content of tissue fluids:—On 7th, 8th and 10th February these were respectively 622, 613 and 613 milligrammes NaCl per 100 cubic centimetres.

There was no tenderness of the calf muscles, no loss of knee nor ankle jerks, and no paresis of the legs and hands. Except for slight enlargement of the superficial cardiac area to the right, there was nothing abnormal in the heart. He was put on food rich in vitamin B, and an iron-ionic mixture containing sulphate of iron with arsenic and magnesium sulphate, and a course of ten injections of strychnine (1/60 grain) given daily. Patient showed marked improvement and was discharged cured on 7th March.

Case 2.—M., Hindu male, aged 65, hawker of vegetables by occupation, admitted on 24th January, 1933, for general anasarca. On examination, there was moderate anaemia, but not enough to cause such an amount of anasarca that he had had for the last two months. Food consisted mostly of leafy vegetables, tamarind water and white rice.

General examination :—Gums—pyorrhœa alveolaris present. Heart—superficial cardiac area slightly enlarged to the left and below, and a soft systolic murmur could be heard in all the areas with equal intensity.

Blood pressure—130/70 on admission.

No tenderness of the calf muscles. Knee and ankle jerks present.

Urine—normal.

Stools—nothing abnormal found.

Blood picture.—Total white blood cells—6,600 per cubic millimetre.

Polymorphonuclears 72 per cent.

Lymphocytes 20 " "

Large mononuclears 2 " "

Eosinophiles 6 " "

Red blood cells—3,150,000 per cubic millimetre.

Hæmoglobin 55 per cent.

Wassermann reaction—negative.

Blood urea—26 milligrammes per 100 cubic centimetres.

Urine urea—0.4 per cent.

Chloride content of tissue fluids :—On 7th, 8th and 10th February these were respectively 613, 585 and 613 milligrammes NaCl per 100 cubic centimetres.

Blood pressure after treatment—140/90.

He made no improvement with diuretics, but when he was put on food rich in milk and fats, and given a course of strychnine injection, grain 1/60 daily for ten days, and an iron-ionic mixture, he made rapid improvement and was discharged cured on 11th May.

Dr. Kahali of the physiological department of the Rangoon medical college very kindly estimated the tissue chlorides from the fluid obtained by puncturing the œdematous extremities with a Southey's trocar and cannula; Folin's and Whitehorn's method was employed. The results all fell within the normal range, which is 560 to 620 milligrammes NaCl per 100 cubic centimetres.

The cause of the general anasarca therefore was neither cardiac nor renal inefficiency, nor alteration of tissue fluids, but the diminished vitality of the epithelium of the capillaries, which were unable to carry on the normal osmosis. Rest, food rich in fats and vitamin B, and strychnine and iron quickly make them recover, whereas if they are treated as cases of chronic Bright's disease or ancylostomiasis they do not show any improvement.

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DIAGNOSTIC SIGNIFICANCES OF URO-BILINURIA IN CASES OF PYREXIA

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Introduction

THE present investigation was carried out at the Indian Military Hospital, Rawalpindi. The remarks apply to men of the Indian Army admitted to this hospital for treatment.

Diagnosis of the fevers in the Punjab present much difficulty, particularly in the Army, where an endeavour is made to label diseases accurately. A sepoy is a fairly intelligent individual, and usually knows all about quinine and its efficacy in mild pyrexia, particularly during the period when the so-called seasonal fever is prevalent. He is protected against the enteric group of fevers by regular prophylactic inoculations and against smallpox by regular vaccination. The result is that a physician in the Army sees cases of varied pyrexia which are atypical. Further, our knowledge with regard to fevers like sandfly fever is hardly adequate. It becomes, therefore, in some cases, very difficult to arrive at a correct diagnosis. Amongst the Indian troops it is difficult to exclude the question of malarial infection, as most of them get infected during the early days of their life in the villages and from time to time when they visit their homes on leave. Malarial infection thus, in these cases, greatly complicates the picture.

Although, the detection of malarial parasites in the peripheral circulation is the final and most definite means of diagnosing this infection, those who deal with cases will admit that it is not always possible to find the parasites in the blood, particularly when it is known that the number of malarial parasites per cubic millimetre of blood in benign and malignant tertian infection when they first produce symptoms may only be 200 and 600, respectively.

Further, a preliminary dose of quinine, which may be insufficient to stop an acute attack of malarial fever, is sufficient to reduce the number of malarial parasites in the peripheral blood circulation, thus making their discovery impossible.

Endeavours are made, therefore, from time to time, to discover some means of diagnosing malaria when the peripheral blood shows absence of parasites.

Jamiat Singh (1930) pointed out the importance of the presence of excess of urobilin in the

(Continued from previous column)

REFERENCE

Rogers, L., and Megaw, J. W. D. (1930). *Tropical Medicine*. J. and A. Churchill, London.

urine in cases of malarial fever,* this excess of urobilin being due to enormous red-cell destruction by the malarial parasite.

Urobilin in urine

Urobilin in the urine occurs normally in small quantity but is not enough to give a positive reaction with the tests employed for its detection. It is only when this substance is present in large quantities that it can be detected in the ordinary way.

Urobilin is a non-threshold substance and is excreted in urine as urobilinogen which, on exposure to air and light, becomes urobilin.

In liver insufficiency, urobilin enters the systemic circulation in large amounts and may be readily demonstrable in the urine.

Similarly, when there is excess of red-blood-cell destruction, as for example, in malaria, hæmolytic anæmias, internal hæmorrhage, or in certain cases of poisoning, again urobilin appears in the urine in large amounts. It has been suggested that, in the tropics and especially in the Punjab, the presence of excessive urobilin in urine in cases of fever, in the vast majority of cases, is indicative of malaria.

This, being a reasonable hypothesis, prompted the present investigation. Endeavour was made to investigate all cases of pyrexia admitted to the Indian Military Hospital, Rawalpindi, from time to time. The cases were not selected in any way. Cases thus studied can be divided into (a) cases of malaria, and (b) non-malarial cases.

Procedure adopted in investigation of cases

All fever cases admitted or detained in the hospital were studied; notes taken of clinical and laboratory findings, particularly in the cases of pyrexia of unknown origin. Special note was made of the exact time and date of onset of the disease to enable one to find out how long it takes before urobilin appears in urine after the onset of fever in the case of malarial fever particularly.

Collection of urine.—Every patient, on admission, was provided with a small glass tumbler on which was pasted a label with the number, name, unit and the ward number of the patient. This was placed by the bed-side and the patient instructed to collect his own urine specimen daily. Those admitted in the morning were ordered to collect all urine passed up to 4 p.m. These specimens were examined the same day at 5 p.m. All the tumblers were then re-distributed to patients

at 8-30 p.m. with instructions to collect all urine passed from 9 p.m. to 6 a.m. the following morning. These were then examined at 10 a.m. daily. Daily examination of urine was done in all cases during their stay in hospital. It will be noted that specimens examined were a whole night's collection.

Tests employed to detect urobilin in urine

Test no. 1. A 3 per cent solution of para-di-methyl-amino-benzaldehyde in 50 per cent hydrochloric acid results in straw-coloured solution. Five drops of this reagent are added to five cubic centimetres of urine: a red colour indicates presence of urobilin in excess. Intensity of colour and the time taken to develop indicate, roughly, the quantity of urobilin present. The following reactions occur:—

(a) *Immediate reaction*, where the urine turns red within five to thirty seconds of adding the para-di-methyl solution.

(b) *Delayed reaction*, where maximum intensity of colour developed 1 to 3 minutes after adding para-di-methyl solution.

A rough method of quantitative estimation of urobilin was adopted by comparing the intensity of colour with three shades of red used as standards. Standard one was labelled '+'; slightly but definitely pink; standard three, was labelled '+++'; intensely red colour; standard two, was labelled '++', intermediate between one and three. This was found to be the most useful and practical method. The quantitative method of estimation by treating urine with an equal quantity of saturated solution of zinc acetate in absolute alcohol, after adding a drop of Lugol's iodine, and then comparing the filtrate with a standard solution of acriflavin (1 milligram of acriflavin in 30,000 cubic centimetres of distilled water, representing one unit) with the help of a Cole's comparator, though more accurate, is very cumbersome and was not found to be practicable.

This test is simple and easily done by the bed-side. It was noticed that a normal urine will show a reddish-brown colour after addition of the reagent when left overnight; to avoid any mistakes the reaction should be read within five minutes of performing the test.

When this test is carried out in a large number of cases, as in the present investigation, the use of drop bottles was very helpful in obtaining uniformity and saving time.

Test no. 2. Add two drops of Lugol's iodine solution to five cubic centimetres of urine and then add five cubic centimetres of saturated solution of zinc acetate in absolute alcohol, filter: the filtrate shows a green fluorescence when urobilin is present in excess. The fluorescence can be intensified by adding a few drops of zinc acetate solution in absolute alcohol. The intensity of green fluorescence again indicates the quantity of urobilin present in the urine. This was also standardized by comparing the three shades of green. The results are noted as +, ++, or +++.

This test is not simple and hence not a suitable bed-side test. It is, however, a simple laboratory test and is, in addition to being a confirmatory test, a reliable one.

In the present investigation both these tests were performed in every case. It was found that in every case both were positive or were both negative, except in a very few cases when the first test gave a positive, +, after some time, i.e., after three minutes, the second test gave a negative result. It is important, therefore, that in cases of doubt both the tests should be performed and more reliance placed on the second test. There was no occasion when the first test was negative and the second one positive from the same specimen of urine.

[* *Note.*—The writer conveys the impression, perhaps unwittingly, that the observation is a comparatively recent one. This is not so; it was made many years ago, and in 1913, Acton and Knowles (*Indian Journ. Med. Res.*, Vol. I, p. 167) investigated the urobilin in the urine in a number of cases of 'latent' malaria.

We take this opportunity to draw the attention of our readers—particularly of those who live in a locality where it is endemic—to the fact that in kala-azar there is nearly always excess of urobilin in the urine; Napier and Sharma (*Indian Med. Gaz.*, Vol. LXVIII, p. 545) found a definite increase in 82 per cent of cases of this disease. The test is therefore of no value in differentiating kala-azar and malaria.—EDITOR, I.M.G.]

Cases investigated

(a) *Malaria cases.*—In this group are included :—

(i) Proved malaria cases, where the malarial parasite was found in the peripheral blood (100 cases).

(ii) Cases diagnosed as 'malarial cachexia', where no parasites were seen in the peripheral blood, but patients were chronic malarial subjects with enormously enlarged spleens (5 cases).

(iii) Clinical malaria cases, where no parasite was discovered in the peripheral blood, yet they were undoubtedly cases of malaria (9 cases).

Of the 100 proved malarial cases, under study, it may be said that they were all mild cases. The different varieties of malarial parasites occurred as under :—

(1) Malignant tertian: 39 per cent.

(2) Benign tertian: 57 per cent.

(3) Mixed infections: 3 per cent (benign and malignant tertian).

(4) Quartan: 1 per cent.

Fever started with a rigor in 94 per cent of cases. Constipation was a very constant symptom, being present in 90 per cent of cases.

Enlargement of the spleen ranged from being palpable on deep inspiration to about three fingers below the costal margin. It was only present in 39 per cent of cases. Enlargement of the spleen occurred in 42 per cent of cases when cases of malarial cachexia and clinical malaria are included.

Although much is said about the enlargement of the liver in malaria, the present series did not exhibit this symptom even in cases of chronic malaria where the spleen was enormously enlarged.

Examination of blood films.—In every case blood films were examined daily during the first and second days of stay in the hospital or till a positive result was obtained. Both thick and thin films were examined in each case.

Results of urine examination

Urobilin in excess occurred in all cases. It did not however occur in a regular manner. It was due to regular daily examination that one detected its presence at some stage of fever. This is to be expected as the appearance of urobilin depends on so many factors. Severity of infection and its duration, liver function and the rather obscure mode of excretion of urobilin by the kidneys will effect the presence of urobilin in urine. Although the number of cases is not large enough to draw conclusions there seems to be sufficient data to draw attention to the following points of interest :—

(1) *During the first 24 hours urine is negative for urobilin or, at best, weakly positive after 12 hours.*—In the present series 33 per cent of cases came to the hospital on the first day of disease; of these 70 per cent gave a negative

result and the other 30 per cent a weak positive, i.e., +. In no case was a positive reaction obtained within 12 hours of the onset of symptoms.

(2) *Positive reaction remains till the temperature comes down.*—The reaction increases each day the fever continues and begins to decrease as the temperature comes down. In one case the reaction became negative a day before the temperature became normal.

(3) *Urobilin lasts up to six days after the temperature becomes normal.*—The disappearance of urobilin from the urine is very irregular; the average period for the 100 cases was 2.33 days.

(4) *Amount of urobilin appears to be in proportion to the severity of infection.*—In the cases of heavy infection, i.e., where a large number of parasites was seen in blood films, marked urobilinuria occurred. This is to be expected, as the greater the number of parasites the more red-cell destruction is likely to occur. There seems to be no relationship between the height of temperature and the amount of urobilin excreted.

Jamiat Singh (*loc. cit.*) states that urobilinuria does not occur in afebrile malaria; I found it otherwise. In order to investigate the high incidence of malaria in a particular unit I examined all men for enlarged spleen; 5 per cent of the total strength had enlarged spleens. None of these men had suffered from an acute attack of malaria during that season, but 66 per cent of them showed urobilinuria. None of them showed any malarial parasites in the peripheral circulation. Both thick and thin films were examined on two occasions. These men were placed on quinine treatment. Fifteen days later their urine were all negative for urobilin, although some of them still had enlarged spleens.

This appears to indicate that malarial infection, even when an acute attack is not produced, causes red-cell destruction resulting in profound anaemia and debility.

(5) *Maximum reaction occurs on the morning following the day on which quinine is administered.*—It is definitely known that quinine *per se* does not cause any hæmolysis of red cells in the blood, but quinine, when given in the presence of hæmolysing agents such as the malarial parasite, increases the marked hæmolysis.

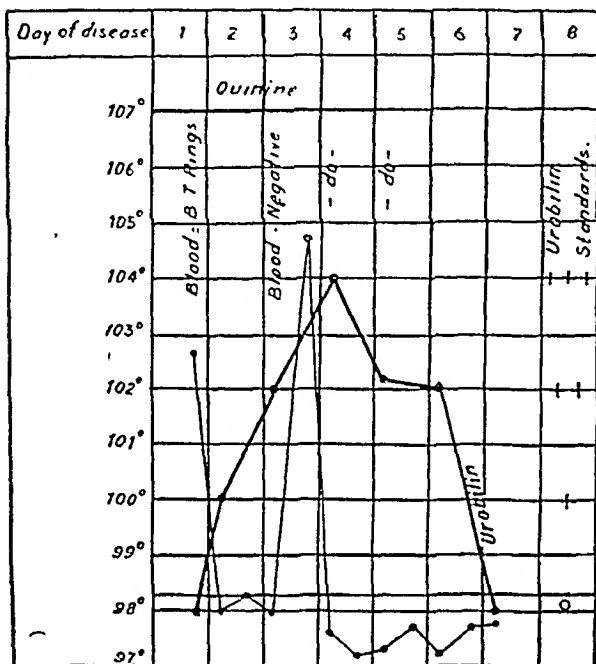
It is unnecessary to dilate on this subject, but I wish to point out that this observation may be utilized in the diagnosis of cases suspected of malaria by giving quinine and examining the urine the following morning for urobilin. Latent malarial infection *plus* quinine will give excess of urobilin in the urine.

(6) *Whole night's urine essential.*—Although a 24-hours' specimen is ideal, a 12-hours' specimen and particularly the whole night's urine is sufficient. Specimens of urine collected after the

first urine in the morning had been voided, in several cases, gave irregular results.

Urobilin curve

The accompanying chart shows details of a case. The dark line indicates the urobilin curve, showing its absence on the first day, maximum rise on the fourth day, and disappearance three days after normal temperature. This may be taken as a typical case.



Non-malarial cases

The practical utility of the foregoing investigation in regard to urobilinuria in malaria is largely dependent on the frequency of occurrence of the same phenomenon in other diseases. It has been pointed out before that urobilinuria occurs in several other conditions (*v. s.*), but in most of these conditions the means of diagnosis are numerous and comparatively easy. Difficulty, however, arises in more common conditions like sandfly fever, the enteric group of fevers (particularly in the atypical ones), tuberculosis, and pyrexia of unknown origin. It is here that the exclusion of malarial infection, a matter of great practical importance, is difficult. Absence of malarial parasites in the blood is not sufficient, but this test, intelligently performed and interpreted, is very valuable.

In the present investigation of the conditions mentioned above, only sandfly fever has been investigated in a sufficiently large number of cases. More work on similar lines is being carried out, and will be communicated at a later date. Suffice it to state that urobilinuria has not occurred in cases of pulmonary tuberculosis, enteric group of fevers and cases of upper respiratory catarrh.

Sandfly fever

Up to date a little more than 100 cases have been investigated. Absence of malarial parasites from the blood and continuous fever of 3, 5 or 7 days' duration seem to be the only diagnostic signs. In the present series 66 per cent of cases started with fever with rigor. Body pains were equally common. Congestion of the conjunctivæ is hardly of any diagnostic significance. The urobilin test, however, is of considerable assistance. In my cases 100 per cent negative results have been obtained, a point of considerable importance.

During the season when these fevers occur together, it was very striking how frequently one saw two patients in the same ward, lying side by side with identical symptoms, one showing urobilinuria and malarial parasites and the other neither of them: the former would get better with quinine therapy, which had no effect on the latter.

I admit that in a mixed case where both conditions are present urobilinuria will occur. It will also occur in the case of a chronic malarial subject who gets, say, sandfly fever. Such a case of sandfly fever, if diagnosed or at least treated for malaria, will be considerably benefited.

Conclusions

1. Excessive urobilin occurs in all cases of acute malaria and in some cases of chronic malaria. In all cases of chronic malaria on the day following that on which quinine is administered.
2. In the Punjab malaria constitutes the commonest cause for positive reactions in cases of pyrexia.
3. The reaction is not specific to or diagnostic of malaria, as it also occurs in many other conditions, both febrile and afebrile.
4. In malaria (a) the tests should be multiple, and (b) they may be expected to become positive on the second or third day of disease, and certainly on the day following the quinine administration.
5. The employment of the test is strongly indicated pending more definite diagnosis of pyrexial cases. The presence of an unexpected positive reaction may suggest malaria: its absence may be equally significant in the contrary direction.
6. The reaction is never positive in uncomplicated sandfly fever.

I wish to thank the Officers Commanding, Indian Military Hospital, Rawalpindi and Bannu, for affording me all facilities for investigation of cases and Lieutenant-Colonel A. C. Hammond-Searle, M.C., R.A.M.C., for advice and help.

REFERENCE

- Singh, J. (1930). *Indian Med. Gaz.*, Vol. LXV, p. 390.

A Mirror of Hospital Practice

A CASE OF EMPYEMA NECESSITATIS, CURED BY ASPIRATION ALONE

By MOHAMMED YAQUB KHAN, M.B., B.S., P.C.M.S.
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U. N., a Muslim male, aged 50 years, was admitted in the Civil Hospital, Isakhel, on 12th May, 1932, with the following history :

About three months previous to his admission, the patient had an attack of acute illness, with high fever, cough, and pain in the left side of the chest. The acute attack lasted for about two weeks; but he never recovered fully and has had fever and cough with expectoration ever since. He continued to get weaker and complained of breathlessness even on slight exertion.

On physical examination the chest showed the typical signs of effusion in the left side—limited expansion of the chest on the affected side, dull percussion note, very much diminished vocal fremitus and resonance, and nearly inaudible breath sounds. The dullness was well marked up to the level of the fourth thoracic vertebra and a few crepitations were heard on both sides.

There was a red, fluctuating swelling in front of the chest about the seventh and eighth left ribs; it had the appearance of an abscess on the point of bursting. It was diagnosed to be an empyema arising during the course of an attack of pneumonia and the external swelling was the pus from the pleural cavity pointing on the surface (empyema necessitatis). The diagnosis was confirmed by an exploratory puncture.

From the 12th to the 19th of May his temperature ranged from 97°F. in the morning to 100 to 101°F. in the evening.

On the 19th, a spot in the ninth intercostal space in the axillary region was anaesthetized with 1 per cent novocain solution, a trocar and cannula of a Potain's aspirator were inserted and about 20 ounces of pus were drawn out.

The pus was greenish-grey in colour and fairly thick in consistency. Unfortunately there was no equipment to examine the pus bacteriologically.

The patient showed improvement immediately after the aspiration; the fever disappeared the next day; the cough and general condition was also decidedly better. The external swelling, however, showed no sign of becoming smaller.

Another aspiration was done on the 23rd May. This time only about 5 ounces of pus came out; it was brownish-grey in colour and much thinner in consistency, being sero-purulent in character.

After this second aspiration the swelling began to subside so that within about five days it disappeared altogether. The patient had no subjective symptoms, fever, cough or breathlessness; on physical examination, however, the affected side still had a slightly dull percussion note and feebly-heard breath sounds. On 30th May the patient left the hospital without permission.

More than a year afterwards I happened to meet the patient. He told me that he had experienced absolutely no trouble afterwards; and had been perfectly normal ever since. I examined his chest and found it quite normal. I consider that this man was permanently cured of his empyema by aspiration alone.

I am indebted to K. S. Dr. Muniruddin, Civil Surgeon, Mianwali, for his permission to publish these notes.

[*Note.*—Empyema necessitatis is defined as an empyema in which the pus burrows externally, producing a subcutaneous abscess which finally ruptures and results in spontaneous cure without operation. This case does not therefore quite fulfil the requirements of this definition.—Ed., I.M.G.]

A TREATMENT OF ACUTE INTESTINAL OBSTRUCTION

By SARDUL SINGH, M.B., B.S.
State Hospital, Gilgit

ACUTE intestinal obstruction occurs so suddenly and the patient is so ill that transportation to a large hospital is frequently impossible.

Under these circumstances any measures that can help the patient are deserving of consideration and trial.

The following method is perhaps not extensively known :—

According to St. Leger Brockman, as quoted by Maingot in his *Management of Abdominal Operations*, the toxæmia following intestinal obstruction or ileus is due to the absence of bile and pancreatic secretion from the intestines. This condition arises owing to the frequent vomiting that occurs in these cases.

The treatment recommended is rectal injection of human bile two or four ounces in normal saline repeated four hourly until all signs of toxæmia have improved.

Human bile is, practically speaking, not available and the patient's own vomited matter may be collected, strained through muslin, diluted with a little saline and injected into the rectum, or alternatively ox bile may be used.

Recently, a case of acute intestinal obstruction has been under treatment here and, as operation was considered unwise, this method of treatment was used with extremely satisfactory results.

I append a few notes.

In this station, as this is an orthodox Hindu state, ox bile is not available and sheep bile was used instead in addition to the patient's own vomitus.

S. A., aged 25, admitted late on 13th February, 1934, with a history of complete stoppage of bowels of twenty-four hours' duration. The abdomen was much distended, tender and attacks of acute colicky pain were frequent; distended coils of intestine were visible.

Enemata, repeated, produced no improvement.

14th February.—Vomiting started in the morning and also severe hiccough. During the day turpentine stupes, hot water bottles, atropine with strychnine, eserine and pituitrin were all tried but no improvement occurred.

At 9-15 p.m. the general condition of the patient became very bad, and marked toxæmia supervened. Hiccough became very troublesome and vomiting was very frequent. The patient complained of great thirst. The abdomen became much distended and the patient was sweating profusely; pulse 112 per minute. At this time three ounces of vomit strained through layers of muslin diluted with two ounces of tap water was injected slowly into the rectum.

At 10-45 p.m. the pulse had improved, the hiccough ceased and the patient began to sleep.

By 11-10 p.m. the vomiting had ceased and the patient slept soundly.

15th February.—At 6-30 a.m. the general condition of the patient was fairly good, abdomen still much distended although some flatus passed during the night; pulse 104 per minute, satisfactory.

Two ounces of vomit strained through layers of muslin diluted with one ounce of tap water was again injected slowly into the rectum.

9-30 a.m. The appearance of the patient seemed improved but there was still no relief of the obstruction. No vomiting, no hiccough.

6-50 p.m. A few small pieces of faecal matter were passed after an enema.

16th February.—The patient slept a little during the night and was definitely worse next morning. Very delirious and toxæmic; the obstruction was unrelieved.

10-45 a.m. Three drachms of fresh sheep bile diluted with three ounces of normal saline were injected per rectum, and 1 c.cm. adrenaline injected hypodermically.

11-5 a.m. The patient passed a large liquid stool, and the symptoms were much relieved.

Two further stools were passed during the afternoon.

The patient was finally discharged from the hospital in a good condition on the 22nd February, 1934.

During the acute stages of illness nothing was given by mouth. Saline and glucose injections—twenty ounces of saline with five per cent glucose—were given intravenously as required.

The above treatment cannot of course cure a case of true mechanical obstruction but even in these cases it should be of great value in improving temporarily the condition of the patient to allow of his transportation to a hospital and to put him in a better state to stand the anæsthetic and shock of an operation.

I am grateful to Major L. K. Ledger, I.M.S., Agency Surgeon in Gilgit, for permission to publish the notes of this case.

A CASE OF PSEUDOCYESIS FOLLOWED BY TRUE PREGNANCY

By A. P. JANA, M.B.
Contai, Midnapore District

THE patient, aged about eighteen years, in her second pregnancy, was in normal health and of average build. She gave birth to a female child in her first pregnancy in an easy labour.

Menstruation had always been regular previously. There was no suspicion about venereal diseases. Her last menstruation was in June 1932, and the members of the family naturally thought her to be pregnant at the time on the strength of the amenorrhœa. There was gradual enlargement of the abdomen consistent with the time of pregnancy. Fœtal movements were said to have been felt by the mother and female members of the family. Though the first child had stopped sucking, the breasts became enlarged and secreted milk in due course. The primary and secondary areolæ all appeared in succession in due time. Pain of an intermittent nature, in the lower abdomen, was also felt after the seventh month. On the 280th day approximately (in March 1933) the pain, of the nature of labour pain with all its signs and symptoms, started. Intense, short-lasting, intermittent pains continued for the whole day and night. There was no bleeding more than the 'blood show'. A drop of homœopathic medicine (belladonna 30) was given and the pain stopped. On the third day from the onset of the supposed labour pain, the bleeding started without any pain. Bleeding became intense and alarming on the fourth day necessitating treatment. Juice of 'durba' (a kind of grass) and sugar one tola per dose was given three times when the bleeding stopped, but the size and contour of the abdomen remained as it was.

From May 1933 onwards she had excruciating pains every eighth or tenth day lasting for three or four hours. The pain would subside on the application of hot fomentation. In the meantime an ecobolic mixture containing ergot and quinine was administered for five days without effecting any improvement. Potassium iodide mixture was given for three or four days. Hot hip baths and foot baths were given but failed to stop the recurrence of the pain. The size of the abdomen remained stationary. A diagnosis was made, and corroborated by others, of a tumour, probably ovarian cyst, requiring surgical treatment.

From May onwards the patient had been feeling fœtal movement as before and, believing her to be pregnant after the last bleeding on March 1933, the relatives postponed her removal to Calcutta for operation until the time of delivery, i.e., December 1933. Some time in May, I was called in to the case but I could not feel any fœtal parts. The abdomen was enlarged to about the size of an eight-months pregnancy and was almost stony hard. No vaginal examination was allowed. I also thought this to be a case of ovarian cyst and advised operation. Again, at the seventh month her abdomen was said to have been palpated by a doctor member of the family but he could neither feel any fœtal part nor hear fœtal heart sounds. In the meantime many abortifacient drugs were used orally and externally on the abdomen by the local Vaidyas. The external applications were mostly blisters. These drugs were used probably with the idea of evacuating the contents of the uterus or abdomen where the tumour was supposed to have been formed. However, in spite of all these attempts at abortion a full-grown female child was born in the first week of December 1933 after a labour pain lasting only a short time. The labour and puerperium were normal in all respects.

I again examined her in her puerperium and found the abdomen normal in all respects.

Discussion.—The points that arise in this case for elucidation are :—

1. Was she pregnant for nineteen months ?
2. The normal size of the child at birth goes against it, but if not, how can the following signs be defined ?
 - (i) Feeling of fœtal movement,
 - (ii) the appearance of primary and secondary areolæ in due time,
 - (iii) secretion in the breasts in due time,
 - (iv) enlargement of the abdomen consistent with the term of pregnancy, and
 - (v) the onset of labour pain about the normal time of delivery.

3. It may be that the first period was a pseudocycsis and she was pregnant for the second period commencing after the bleeding in March 1933. If so, does a case of pseudocycsis present all the signs and symptoms typical of a true pregnancy ? It should be noted that she was not examined at any time under anæsthesia. Possibly the gradually growing fœtus within the uterus found space in the already enlarged pseudocycetic abdomen. The size of the abdomen remained stationary for the whole of the period of pregnancy from March to December 1933.

4. It is peculiar indeed that the pregnant uterus did not abort in spite of so much rash and indiscriminate use of drastic abortifacient medicines. Different authors have cited such

cases that baffle all attempts to procure abortion.

5. The supposed labour pain which she experienced in March 1933 was probably dysmenorrhœal, because the pain of the first day was accompanied by only a little blood (said to be like 'blood show'). This pain subsided with a free flow of blood on the third day. The bleeding remained for about five days, the normal period of menstrual blood flow.

I must thank Dr. Ashutosh Panda of Bathuari, in whose family the case occurred, for kindly allowing me to note the history of the case and to examine her again in her puerperium.

A CASE OF CARDIAC FAILURE WITH COMPLETE HEART BLOCK

By G. L. SHARMA, M.D., B.S.

Senior House Physician, King George's Hospital, Lucknow

P., AGED 26 YEARS, cultivator, was admitted to the medical wards with the following complaints:—

Breathlessness on exertion—three months.
Cough with a little expectoration—fifteen days.
Discomfort in abdomen.
General weakness.

About three months ago the patient noticed gradual bulging of the abdomen and puffiness over the face and feet. During this time he used to feel exhausted and very tired after doing a little work in the fields. One month ago he suddenly became unconscious while chatting with a friend. He was told about this incident by those who were near him because he himself never realized his attack owing to its very short duration (a few seconds). Shortly before admission into the hospital the patient had noticed blood-stained sputum for a few days.

The patient is a young man of good physique; he is slightly anæmic; his abdomen is swollen, and his face puffy; œdema is present over the ankles and dorsum of feet; his lips are cyanosed.

Cardiovascular system.—

Pulse rate—34 per minute, rhythm—regular, tension and volume—normally good.

Inspection—no præcordial bulging or recession; cardiac impulse outside the mid-clavicular line; pulsation visible in the neck, jugular veins prominent and enlarged.

Palpation—apex beat in the fifth interspace one inch outside the mid-clavicular line; no thrill present in the præcordium; apex beat is slapping in character.

Percussion—Upper boundary of the heart under the third rib; left boundary one inch outside the mid-clavicular line; right border one and a half inches from the mid-sternal line.

Auscultation—Rhythm regular, rate same as pulse; both the first and the second cardiac sounds are feeble and distant suggesting bad quality all over the præcordium; systolic bruit, soft in character, best heard over the mitral area and propagated out to the anterior axillary line.

Blood pressure—102 mm. systolic, 35 mm. diastolic.

Respiratory system.—Moist râles, most marked at the pulmonary bases.

Alimentary system.—No pyorrhœa alveolaris present; liver enlarged three fingers below the right costal margin; the upper boundary is in the fifth interspace; spleen enlarged four fingers below the left costal margin.

Urine examination.—Specific gravity—1012; albumin, sugar, acetone, and bile salts—absent.

Blood examination.—Leucocytes—3,600 per e.mm., polymorphonuclears—54 per cent, lymphocytes—41 per cent, eosinophils—5 per cent.

Urea stibamine test (1 in 10)—faintly positive.

Formaldehyde test—negative. Wassermann reaction (after provocative neosalvarsan) completely negative.

Cerebrospinal fluid examination.—Wassermann reaction—negative, completely; Pandy's test—negative, albumin—0.02 per cent.

Electrocardiography.—The electrocardiogram showed complete dissociation between the auricular complex P wave and the ventricular Q.R.S.

Commentary

Most of the cases of heart block fall within four groups from the ætiological point of view:—(a) the rheumatic, (b) the syphilitic, (c) the acute infectious diseases, (d) and the arteriosclerotic group.

(a) Patients, usually young adults who have previously suffered from rheumatic infection of the heart, may show signs of heart block besides other manifestations of damage to the heart. This may be due to a greater degree of damage to the myocardium and the conduction system, because heart block is so intimately connected with myocarditis and myocardial scars, or the Aschoff bodies may be situated in the pathway of the bundle. In such cases heart block may be induced by full doses of digitalis or drugs of this group. I believe that the case in question had rheumatic infection some time before and developed signs of myocardial failure with enlargement in the size of the heart, congestion at the pulmonary bases, enlargement of liver, engorgement of systemic venous system, œdema on the dorsum of the feet and symptoms of effort syndrome dyspnoea, palpitation, fatigue and præcordial pain on exertion.

One month ago, manifested by a minor Stokes-Adams' attack, he developed complete heart block. There are few signs of valvulitis (mitral) in this case.

(b) The second cause, and probably the most important, is syphilis, the lesions being represented by inflammatory collections of characteristic cells or by the subsequent syphilitic scars. In rare cases a gumma may be found in the upper part of the interventricular septum. An infarct of the myocardium in the region of the bundle due to coronary thrombosis will produce the same result or the scarring may be due to gradual obliteration of the branches of the vessels that supply the bundle. In a young man suffering from gonorrhœa, who suddenly developed a very slow pulse rate, a mass of Neisser's diplococci plugging the artery to the septum were demonstrated. In our case syphilis does not play any part.

(c) Acute infectious diseases like influenza, typhoid, pneumonia and diphtheria may produce a lesion in the conduction system giving rise to heart block and the occurrence of partial heart block during the course of an acute infective disease is a sign and may be the only sign of myocardial involvement. The condition is

usually temporary in these cases. There is no history of any acute infective disease in this case and the duration of cardiac failure present is out of proportion to the damage likely to be done during the course of an acute infection, in which the failure is likely to be acute, and may suddenly terminate fatally.

(d) Arteriosclerosis when affecting the branches of the coronary artery may bring about the condition of heart block. The young age, low blood pressure, and absence of any thickening of arteries negative the possibility of this condition existing in the present case.

Treatment

(1) Absolute rest in bed.
(2) Insulin 10 units twice daily subcutaneously after meals followed by administration of 2 *chittaks* of sugar for one month.

(3) Atropin sulphate 1/100 grain—twice daily—was tried but no alteration in the pulse rate took place.

(4) Tincture digitalis 10 minims with 15 grains of potassium iodide—three times daily—was tried for a fortnight without any effect.

The patient left the ward with a slow constant pulse rate of 36 per minute. The symptoms of effort syndrome dyspnoea, palpitation, fatigue and precordial distress had disappeared.

I am very much indebted to Colonel G. T. Burke, M.D., F.R.C.P., I.M.S., Physician to King George's Hospital and Professor of Medicine, University of Lucknow, for permission to publish this case.

ACUTE PSOAS ABSCESS

By V. SRINIVASAN, M.B., F.R.C.S.

CAPTAIN, I.M.S.

(Surgical Specialist, Calcutta)

A COLLECTION of pus in and around the psoas major muscle is generally chronic in nature and secondary to tuberculous disease of the spine. However, sometimes it is of an acute type. Such a case is seldom diagnosed correctly, not because the condition is rare or obscure but because the frequency of its occurrence is not appreciated. Recently Sworn (1933) has described three cases and quoted more from the literature. Baer, Bennett and Nicholas (1923) discuss forty-two cases of psoas abscess due to causes other than tuberculous disease. The following case, recently under my care, illustrates the usual features of this condition:

K., a boy aged 9 years, was referred to me as a case of tuberculous lymphadenitis of the groin. The history was that on 26th January, 1934, he got up at night to pass water and during micturition felt severe pain in the left loin, shooting down the left thigh and to the root of the penis. The pain persisted for a few hours after which it became easier. The same day he developed a fever of 101° which remained continuous for three or four days and then became suppurative in type. Along with this, the boy could not straighten his left leg. When first seen by me on 16th February, the boy was acutely ill, wasted, had a coated and dirty tongue, and a temperature of 102° F. The left thigh was kept flexed to a right angle and attempts to straighten it passively were strongly resisted and very painful.

The abdomen was rigid, the rigidity being more marked on the left side. Careful palpation showed a sausage-shaped swelling in the left iliac fossa, with its long axis parallel to the inguinal ligament. The swelling was hot, tender and bony with a suggestion of softness in the centre. Careful examination failed to reveal evidence of spinal disease. The movements of the hip joint except extension were quite painless and free. Total leucocyte count was 18,000 per cubic millimetre. X-ray showed no bony lesion of the spine, ilium or hip joint. No other septic foci were discoverable. The urine showed no abnormality.

On 17th February, the swelling in the iliac fossa was explored with a needle and syringe and a few drops of thick pus and blood withdrawn which showed staphylococci and pus cells. On 18th February, the abscess was opened through an incision above and parallel to the inguinal ligament. It was extraperitoneal and was tracking down from near the lower pole of the left kidney. Counter drainage was established through a tube in the loin and the wound closed.

Subsequent progress was uneventful and full extension of the hip joint was regained in a month's time.

Discussion

Ætiology.—Acute psoas abscess may be primary or secondary. The secondary form may be due to a perinephritic abscess which tracks downwards along the psoas (this is favoured by the arrangement of Zuckerkandl's fascia) or an empyema which has burst below the 12th rib. It may follow acute osteomyelitis of the ilium or lumbar vertebra. It may be secondary to an appendix abscess which has burst extraperitoneally. Sometimes it follows suppuration of the retroperitoneal lymph glands particularly those along the common and external iliac arteries. The primary form is usually pyæmic in origin. In favour of this view are: the patient is often very ill previously; the onset of the abscess is quite abrupt; there may be other abscesses; the symptoms often subside quite rapidly and the absence of lesions to which the abscess is secondary; further the abscess is confined to the sheath of the psoas.

Diagnosis is quite easy if the possibility of this condition is remembered. The patient has a septic type of fever and complains of pain down the leg on the affected side or referred to the root of the scrotum. The characteristic sign is flexion of the hip which is quite marked and is more than can be accounted for by mere spasm of the psoas. The presence of a sausage-shaped swelling is pathognomonic. There is leucocytosis. Careful examination aided by radiography will eliminate bone disease.

Treatment.—Aspiration should be done first and if the examination of the pus suggests pyococcal origin, drainage should be established. The incision should be over the most prominent part of the swelling; but if there is no local swelling, an incision parallel to and two inches above the outer third of the inguinal ligament is the best. Great care should be exercised not to open the peritoneum. Counter opening posteriorly may be necessary. All loculi should be gently broken down. If the contraction of the psoas does not begin to disappear in a few days.

after operation, weight extension will be necessary. Prognosis is usually very good.

REFERENCES

- Baer, W. S., Bennett, G. E., and Nielas (1923). *Journ. Bone and Joint Surg.*, Vol. V, p. 590.
Sworn, B. R. (1933). *Brit. Med. Journ.*, Vol. II, p. 6.

SURGERY OF THE SYMPATHETIC

By V. L. SURYAVANSHI, M.S.

Sassoon Hospital, Poona

THERE are few diseases requiring operations on the sympathetic nervous system and, even in the presence of indications, very few operations are being performed in this country, partly owing to the fact that some of these are rather difficult, and partly to the uncertainty of the results. The following notes will, it is hoped, interest readers :

T. R., a Hindu female, about thirty-five years of age, was admitted into the Sassoon hospital, Poona, on the 29th March, 1932, for an ulcer on the right foot (under the care of another surgeon). She used to smoke much and lived on a mixed diet. Since the age of eleven she had felt alternate coldness and burning in her hands and feet. This was also accompanied by pain. The right foot later on showed signs of gangrene and was amputated at the site of election on the 1st November. The pain and other symptoms were becoming worse day by day and she had to be given morphia. She was kept in the infirmary as an invalid.

I was asked to see her in September 1933: I found her to be extremely emaciated and unable to leave her bed. She had gangrene of the left foot and had already lost four toes; there were deep ulcerations on the dorsum of the foot and black patches of necrosis on the leg up to the knee. The ulcers were very painful and she could not tolerate the weight of a blanket on the foot. The pulse in the dorsalis pedis artery could be felt only at intervals. The radial pulse on the right side could not be felt. The hands were cold. I diagnosed the condition as Raynaud's disease and decided to perform the operation of lumbar sympathectomy on both sides. She consented to this and was accordingly operated on; recovery was uneventful. The ulcers were dressed with zinc and boric ointment containing some perein and the legs covered with plenty of wool and flannel bandages. In about two months time I was surprised to find that all the ulcers had completely healed, the necrosed skin had fallen off and was replaced by new skin and her symptoms in the legs were ameliorated. Her general condition improved considerably by not being troubled with pain and sleepless nights. Encouraged by the result, I proposed to her that she underwent 'cervical sympathectomy' on the right side as the symptoms in the arm on that side were worse. The patient, satisfied with the improvement, readily consented to the operation. Under local anaesthesia, I exposed the cervical sympathetic chain by the anterior route and removed the inferior cervical ganglion and its communication with the first thoracic. I was extremely astonished to note that the pulse in the right radius became perceptible and got this fact confirmed by my colleagues. The symptoms in that arm abated. Although at first unable to bear the weight of clothes on her foot she is now able to move about on crutches resting the left leg on the ground.

If this case had been treated as above in the beginning, I think she would have obtained greater relief.

The surgeon who had amputated her right leg thought it to be a case of thrombo-angiitis obliterans, on this point however I do not agree with him.

A CASE OF HYDATID CYST OF THE LUNG*

By TULSI DASS, M.B., B.S.

and

PIRTHI CHAND, L.M.P.

Civil Hospital, Giddarbaha, Ferozepore District, Punjab

On the 26th April of this year a Hindu boy, fourteen years of age, was brought by his parents for consultation to the civil hospital, Giddarbaha, district Ferozepore, from Bhuchan, a market in the same district. His general ill health was attributed chiefly to short bouts of coughing, a feeling of heaviness in the left chest and a long irregular fever for the previous six months. The boy was examined in routine and it was found that the left side of the chest had restricted movements, gave a dull, solid note on percussion, was airless with complete loss of vesicular murmur and vocal resonance but without any obliteration or bulging of the interspaces, right up to the middle of the scapula behind.

A provisional diagnosis of effusion in the chest was made, and the relatives were informed about the boy's condition and advised to have the chest aspirated before any other line of treatment was adopted. Having obtained their consent we made preparations to aspirate in the ninth interspace at the scapular line. We succeeded with a good deal of difficulty in inserting the trocar and, contrary to expectation, the fluid that came away was unusually clear. The fluid actually began to trickle through the cannula before the trocar was removed.

As soon as the fluid began to collect in the bottle, the boy started coughing, developed dyspnoea and expectorated a clear, viscid, frothy mucus. When about four ounces of fluid had collected in the bottle, the flow suddenly stopped in spite of our efforts to move the cannula in various directions. The cough increased, became incessant and the boy seemed to be in a condition of anaphylactic shock.

It suddenly struck us at this point that it was a case of hydatid cyst of the lung and the question of an immediate radical operation had to be considered. The guardians, on being informed of his grave condition, would not however consent to an operation in spite of our advice.

The child, therefore, was made comfortable in the bed, as nothing could be done except to watch and wait.

The fluid collected was subjected to laboratory tests, both chemical and microscopical. It was of very low specific gravity, non-albuminous and contained traces of sugar. A film from the deposit was prepared and examined under the high power of the microscope. Numerous hooklets were observed which confirmed the case to be one of hydatid cyst of the lung.

The child although in bed was now in agony because of severe cough, dyspnoea, laboured breathing and continually increasing surgical emphysema which had reached from the thorax to the neck and cheeks in about three hours.

The relatives were again made to realize the great necessity for immediate operation to save the child and fortunately gave their consent.

The child was once again put on the table for operation. General anaesthesia was out of the question as the respiratory system was already sufficiently embarrassed. Spinal anaesthesia could not be resorted

* Rearranged by Editor.

to for fear of paralysing the vital centres in the medulla. We decided finally to employ a local anæsthetic.

The skin was completely anæsthetized for a radius of two inches around the original puncture with ethyl chloride and an incision made down to a ninth rib along its axis with all the necessary antiseptic precautions. The periosteum over the rib was denuded to a distance of about one and half inches and a piece of bone one inch long was cut and removed. The pleura was further incised and about eight ounces of fluid gushed out.

When the pleural cavity was almost completely drained and the lung tissue well in view, a second puncture with a long needle and a two-cubic-centimetre syringe was made. A syringe full of fluid was withdrawn from a prominent part of the lung.

This confirmed the origin of the cyst and at the same time encouraged us to make a free incision. The parietal layer of the pleura was stitched to the chest wall all round the wound margin to shut off the cavity and prevent systemic infection. The lung was incised at the place of second puncture, some fluid drawn out and a big cyst about the size of a child's head along with its contents was removed. The cavity was washed out with normal saline, a tube stitched in and the wound closed.

The whole operation took about forty minutes but during all this period local anæsthesia was kept up with generous sprays of ethyl chloride. The child faced the operation very bravely, although he was in great trouble on account of a constant irritating cough throughout. The coughing was beneficial however in expelling the cyst with its brood capsules, etc., from the cavity. The child is still in the hospital and progressing.

Conclusion.—Hydatid disease of the lung though rare still demands special consideration in the diagnosis of respiratory troubles especially in cases with effusion.

2. The disease is an insidious one and often not attended with any great symptoms. The clinician therefore is misled and can easily be thrown off his guard.

3. Before having recourse to tapping it is advisable to make an exploratory puncture, examine the sputum and blood of every patient in the hope of finding something extraordinary (hooklets and eosinophilia, etc.).

4. If a cyst is accidentally tapped, immediate operation is the only expedient.

5. Local anæsthesia if properly administered often obviates the risk of shock and other untoward symptoms.

A CASE OF RESUSCITATION BY PUNCTURE OF THE VENTRICLE

By M. GANGULI, M.B.

Anæsthetist, Medical College Hospitals, Calcutta

P. D., a Hindu male nineteen years of age, was being operated on on the 17th March, 1934, for a right-sided varicocele under pure ether, the induction having been made with chloroform. The operation was started while the patient was completely under surgical anæsthesia and had been given pure ether for about eight to ten minutes. Atropine sulphate, 1/100 grain, was given subcutaneously about half an hour before the induction of anæsthesia which was very smooth without any struggling or shouting.

About three minutes after the operation was started, while the cord was being separated, the patient stopped breathing after taking three or four unusually long deep breaths and the pulse was found to be absent.

The following steps were taken in quick succession. The face was rubbed hard with a towel, the Trendelenburg position was adopted with the legs at right angles to the trunk and the cardiac region was smacked twice with a hot wet towel. The mouth was held open with a gag, the throat sponged and the tongue pulled out and relaxed alternately three times. Simultaneously with the pulling out of the tongue artificial respiration was started and continued without any effect. The heart was auscultated directly without any sounds being audible. The rectal sphincter was dilated and it was found to be so lax as to allow four fingers to go in with ease. As there was no response, the needle of a serum syringe which was at hand was introduced through the fourth left interspace three-fourths of an inch internal to the nipple line and immediately withdrawn. The heart was again auscultated but there was no positive sign. The needle was again introduced a little deeper through the same puncture. A distinct resistance was felt this time as if piercing some muscular structure after passing through the parietes. The needle was held between the index finger and the thumb for about two seconds when suddenly a distinct movement was communicated to it and simultaneously a medical graduate who was feeling the right radial artery said 'yes'. On feeling the pulse the first few beats were found to be feeble, irregular, unequal in volume and tension, and rather slow.

The time that had elapsed between the last expiration with the disappearance of the pulse and the puncture must have been about three minutes.

As the respiration had not returned, artificial respiration had to be continued for about another minute before the first feeble effort at inspiration was noticed. The patient was watched for another six to seven minutes during which time oxygen was given. As it was found that the patient was behaving satisfactorily the anæsthetic—ether—was administered again and the operation completed without any further trouble.

During the period that the patient was in cardio-respiratory paralysis the pupils did not react to light and were not very widely dilated. They were in that degree of dilatation which obtains in deep but safe narcosis with ether. The pupils were fixed in that position the whole time and only started contracting after the pulse and respiration had returned. The patient was so dark that very little could be made out from the colour of the lips or nails.

The patient recovered from the effects of the anæsthetic without any convulsions or prolonged period of unconsciousness. The convalescence was uneventful and he left our care on the fifteenth day from the date of the operation, without any symptoms of changes in the cerebral cortex due to lack of circulation for the few minutes during which the patient was in cardio-respiratory paralysis.

The patient's heart and lungs were normal and he had been operated upon for lymphangiectasis of the left side under chloroform-ether anæsthesia a couple of months ago.

The points of interest are discussed below :—

Primary cardiac failure may occur during the administration of pure ether in a chloroform-ether sequence.

Atropine in grain 1/100 dose does not always prevent vagal inhibition though it may be mentioned that in the present case it is not possible to be certain whether the failure was due to ventricular fibrillation or vagal inhibition. The protective action of atropine before chloroform administration nevertheless seems doubtful.

There was no doubt that the myocardium had ceased contracting as was found with the puncture of the needle, which gave a distinct movement when the heart resumed its contractions.

It must have been the stimulus of the puncture that started the contractions of the heart again.

Though recent researches tend to show that the auricles are more sensitive to puncture than the ventricles, in this case it must have been the ventricle as a longer needle was not at hand at the moment, and the desired result was obtained.

In this country instances of resuscitation by simple puncture of the ventricle has, to my knowledge, not been recorded.

My thanks are due to Professor L. M. Banerjee, M.S., F.R.C.S., surgeon to the medical college hospitals, for allowing me to publish this case and for his kind help in writing this paper.

A CASE OF EXTRAVASATION OF URINE DUE TO A CALCULUS IN A CHILD SIX YEARS OF AGE

By B. SUKHAVANAM, L.M.P.

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N., a male child 6 years of age, was admitted into the Municipal Hospital, Nandyal, on the 23rd April, 1934, at 11 p.m. with retention and extravasation of urine of forty hours' duration.

Condition on admission

Patient toxæmic, quick pulse, dry tongue, abdomen distended and tympanitic and absolute constipation for two days.

Bladder distended up to umbilicus.

Scrotum, penis and perineum swollen and phimosis was also present. No vesical calculus was felt per rectum on three consecutive examinations.

Treatment

A soap-water enema was given without effect.

A dorsal slit was made and the meatus was exposed. A rubber catheter proving ineffective, a small-sized metal catheter was passed very slowly and carefully and an ordinary kidney tray full of urine was drawn off very slowly. Multiple incisions on the scrotum, penis and perineum were then made, and the catheter tied up.

Turpentine stupes to the abdomen were applied. A turpentine enema was given and this time hard scabulous masses were evacuated.

Glucose and water in sips were frequently given by the mouth to tide over the toxic condition.

Progress

Patient was progressing fairly well except for an occasional rise of temperature to 101°F. on three different occasions. Three days later a lump was felt in the right lumbar region and the boy complained of pain there. Turpentine stupes to the abdomen were given and the urine was drawn off every six hours by a rubber catheter after which the swelling and pain subsided.

Twenty-three days later the patient began to leak urine through the peno-scrotal junction. An incision was made in the middle line near the fistulous track and a small urethral calculus $\frac{3}{4}$ inch by $\frac{1}{4}$ inch with one end bigger than the other was removed. After this the patient made an uneventful recovery.

No stone was felt in the bladder per rectum at first probably on account of the smallness of the stone and of its being impacted in the urethra which caused retention and extravasation of urine.

After the drawing of urine the stone might have been dislodged in the subcutaneous tissues and hence it escaped notice. The lump referred to above suggests back pressure on the kidney. Can there have been a calculus in the ureter?

The small size of the stone extracted suggests this to be a ureteral one.

Lastly I wish to thank the assistant surgeon, Dr. S. Ramadas, L.R.C.P., M.R.C.S., for kindly permitting me to use the case notes and valuable suggestions.

Note.—It can scarcely be said that a stone $\frac{1}{4}$ by $\frac{1}{4}$ inch is a small one. It would appear unlikely that a stone of this size could pass down the small ureter of a child. The lump referred to above might have been due to general back pressure from the bladder or possibly to the presence of some other small stone in the ureter. From the fact that the swelling subsided after some urine had been drawn off, the first possibility appears to be the more likely.—Editor, I.M.G.

RUPTURE OF THE HEART

(WITH SLIGHT EXTERNAL MARKS OF VIOLENCE)

By S. R. INGLE

Medical Officer, Mirajgaon (District Ahmednagar)

THE rarity of such an injury and its medico-legal importance have prompted the publication of the following case:—

History of the accident.—A driver of a motor-lorry with about a dozen passengers, while driving over a causeway about eight feet high, lost control of the car, with the result that it fell into the water (knee-deep) below, on its side. One of the passengers aged about twenty-five years died instantaneously while others escaped with minor injuries. The car was practically undamaged.

An autopsy held by me on the deceased to ascertain the cause of the death revealed the following appearances:—

(1) Two ante-mortem contusions, 2 inches by 1 inch and 3 inches by 1 inch each, over the outer side of the right arm.

(2) Contusion over the front of the chest $3\frac{1}{2}$ inches by 3 inches.

(3) All the internal organs were pale in appearance, but healthy.

(4) Oozing of blood from the nostrils and mouth.

(5) Left pleural cavity contained about one pound of watery blood-stained fluid. There were a few ecchymosed patches from half an inch to three-fourths of an inch in diameter over the anterior surface of the left lung.

(6) The posterior aspect of the pericardium was deeply injected; but there was no tear. On opening the pericardium about ten ounces of fluid and clotted blood were found inside. There were two tears admitting the tip of the index finger over the posterior aspect of the right chamber with a few adherent blood clots. No fracture of ribs or vertebræ was detected.

Comments.—Rupture of the heart may occur independently of external marks of violence, or from a slight external violence if it is diseased. Again, external violence may cause rupture of an even healthy heart either with slight marks of external violence or without external marks of injury being visible. The case reported above falls under the former category. Few such cases have been reported; but no explanation has been offered as to the mechanism by which this accident is brought about.

Indian Medical Gazette

AUGUST

MEDICAL RESEARCH

THE popular conception of the medical research worker is a man who spends his life, either looking at small objects through a microscope, or with an intent expression on his face holding up a test-tube to the light, or gazing fixedly at some bubbling fluid in a flask; and above all he makes great discoveries at least once a week. The better educated amongst the laity will, of course, repudiate any suggestion that they share this conception, but, though they may envisage wider fields of activity, they still look upon his life as one continuous romantic exploration of untrodden paths. Even the average medical man usually has a very vague idea of what really constitutes medical research; he has an underlying feeling that it must be done in a laboratory, chemical or bacteriological, or, if he is more advanced in his ideas, he will probably concede pharmacological or biochemical; further, he seems to think that anything done in such laboratories, *ipso facto*, constitutes medical research work.

That this conception of medical research prevails in India is quite obvious from the large number of private 'clinical research' laboratories that have been established in every large town in the country; in these are carried out individual routine examinations of blood, urine, and faeces, which are all very necessary work and useful to the practitioner and his patient, but they remain as individual examinations, they are not correlated with other similar examinations, nor even with the clinical condition of the patient whom the laboratory worker has probably never seen; useful and necessary as such work is to the individual, it adds nothing tangible to the sum of our knowledge of the cause, nature, or treatment of any disease, and is therefore no more research work than is the general practitioner's daily visiting round.

We can go higher in the scale and still find the existence of misconception regarding the nature of medical research work. Recently, a member of a body that deals with the allocation of funds for medical research in India expressed the opinion that, during the present financial stringency, basic research should be given up and only 'urgent medical problems' should be tackled; such a suggestion could only be born of complete lack of experience. Anyone who has attempted to solve any medical problem in this country knows that his greatest difficulties are due to the paucity of basic knowledge, whether this be connected with the identification of insects, or with normal standards for

biochemical examinations. More work has been done on the mosquito in this country than in almost any other in the world, and yet, as every malariologist soon finds out, there are still huge lacunae in our basic knowledge of the bionomics of this insect waiting to be filled. Again, when a biochemical investigation is undertaken it immediately becomes obvious that European and American standards are inapplicable in India and that if the danger of arriving at erroneous conclusions is to be obviated, it is necessary before tackling the 'urgent medical problem' to spend many months investigating the normal standards of the population.

'That is all very well', will probably be the reply, 'but what about the great research workers of the past? Did Jenner, Pasteur, Koch, Manson, and Ross require all this background—this basic knowledge?'

The answer to this criticism was made by one of these pioneers over fifty years ago. Robert Koch, referring to his own discovery of the tubercle bacillus, said that the gold was at that time near the surface but that future generations would have to dig deeply for it. The fact that the gold was near the surface does not in any way detract from the value of the discoveries of these pioneers, for to them lies the credit of looking where others had not thought to look, for recognizing what they saw as gold, and for indicating to posterity where almost limitless quantities of the precious metal were to be found if only they would dig for it. Little gold now remains near the surface—the day of the brilliant though untrained investigator, who works not only alone but in the face of the opposition and criticism of his contemporaries and discovers the causative organism or the transmitting agent of some disease, is passing, if it has not already passed; in future great medical discoveries will be made not by individual and sporadic essays at a problem but by organized and systematic investigations made by teams of trained workers. This does not mean that there is no room for individual workers, far from it; in India it will only be possible in a few of the larger institutions to get a team of workers actually together under the same roof, but work can still be organized and systematic, even if the workers are not in the same town, or in the same province; provided the clinical research worker in the field and the laboratory worker keep a common purpose in view and supplement each other's work, the distance of a few hundred miles that may separate the actual workers need make no difference to the co-operation of the team.

We are in agreement that this is not the time and India is not the place to undertake purely academic research. By this we mean investigations that add to the sum total of the scientific knowledge of the world but that have

no apparent bearing on any medical problem of the day. Admittedly many such investigations in the past have proved invaluable, as one can never foresee where they will link up with some actual medical problem, but there are still so many other investigations waiting to be undertaken which are known to have an immediate bearing on some medical problem that it is not the time to indulge in the luxury of academic research. It will undoubtedly be difficult to differentiate between basic and purely academic research, and many border-line instances can be cited; we will cite one. Some species of the genus *Culicoides* are blood-sucking insects and therefore potential carriers of disease; further, they are parasitic on mosquitoes. They are a huge genus of which there are many species in India; many of these are still unidentified. Recently, when they came under suspicion as possible transmitters of kala-azar, it was found almost impossible to do any experimental work with these insects in the absence of any basic knowledge regarding their differentiation and habits. Taking the other point of view, we should argue that the blood-sucking *Culicoides* being almost entirely cattle-blood feeders are therefore unlikely to transmit human disease, and consequently any entomological investigations on insects of this genus might be considered basic from a veterinary point of view, but academic from a medical. What is academic to-day may however be basic to-morrow, so that this line of distinction is not a sharp one, and it will be best at the present time, when other problems abound and money is short, to keep well away from this line.

Though the circumstances in India and in Great Britain are in every way different it is instructive to consider the type of research work that is being done in the latter country. This can be seen from the reports issued by the Medical Research Council. We will take two examples from amongst the reports that have

been reviewed recently in these columns: 'The chemistry of flesh foods and their losses in cooking' and 'A study in growth and development; observations in successive years on the same children'. Though they have no immediate bearing on any specific medical problem, the importance of these two enquiries cannot be denied; the information obtained will not be useful to one research worker, but to thousands of research workers, physicians and others, and will be referred to repeatedly for many years to come. They are examples of basic but certainly not academic research. We are not suggesting that they would be suitable subjects for research in this country. At the present time far too little is known about the chemical composition of the standard diets of various groups of people in different parts of India for an investigation of the nature of the first of these two examples to be of any practical value, and with regard to the second we have so much to learn about the normal physical standards of the children of the various castes and races that it will be many years before the expenditure of time and energy on such an elaborate enquiry on any single group of children would be justifiable.

In India there are still large gaps in our basic knowledge much closer to the specific medical problems we are attempting to solve, but as time goes on these will be filled, and the tendency will be for the medical research worker in this country, following the lead of his prototype in western countries, to make wider and wider circles around his objective.

To return to Koch's simile, as we have said above, the time is rapidly passing even in India when the gold will be found in any appreciable quantity near the surface; it is therefore time to discourage amateur scratching about in the top layers of the soil and to organize scientific mining, if the gold, which we know exists in far greater quantities than it does in European countries, is to be discovered.

Medical News

THE BRISTOL MEDICO-CHIRURGICAL JOURNAL

THIS journal, which occupies a high position amongst British provincial medical quarterlies, has now completed its fiftieth year. The editors have marked the occasion in a very practical way by issuing an index covering this half century of publication.

The journal has had numerous contributions from men with a world-wide reputation as well as from many who have subsequently become famous. The names of Hey Groves, Rendle, Short and Watson-Williams are essentially associated with the Bristol school, but their fame—as well as their books—has spread to the furthest limits of the British Empire.

Amongst names familiar to our readers we see Leonard Rogers, F. P. Mackie, and, inevitably, V. B. Green-Armytage.

There have been few years during the life of the journal when a Watson-Williams has not been associated with it, it is therefore appropriate that Mr. E. Watson-Williams should be mainly responsible for this useful and well-arranged index.

THE O'CONNOR MEDICAL ASSOCIATION

At a meeting of the Panitola Medical Association, held at Tinsukia on 8th June, the following resolutions were proposed by Dr. A. C. Dey of the Rajgorali Tea Estate, and carried unanimously.

1. That the Panitola Medical Association records its profound grief at the irreparable loss it has sustained through the death of Dr. F. W. O'Connor, M.A., M.B., B.Ch., D.M. & H. (Canb.), the President and Founder of the Association.

2. That this Association feelingly observes and records its deep sense of gratitude and obligation to its late lamented President, of his whole-hearted devotion to the cause of the Association and for his extremely courteous and sociable manners.

3. That as a mark of respect and also with a view to perpetuating the memory of the Founder of the Association the name 'Panitola Medical Association' be changed and renamed 'The O'Connor Medical Association, Panitola'.

4. That this Association records its deep sympathy for Mrs. O'Connor and her children in their bereavement.

5. That a copy of this resolution be sent to Mrs. O'Connor through the deputation consisting of the following members:—Dr. B. N. Bornah, Dr. N. B. Kar, Dr. K. M. Gauguly, Dr. G. C. Sil, and Dr. S. N. Mitra.

MEDICAL COUNCIL FOR INDIA

We have from time to time referred to the formation of a Medical Council for India, but, as the subject became acutely controversial, we have recently, in pursuance of our policy of avoiding controversies of a medico-political nature, abstained from reference to the subject. Now however this council is a *fait accompli*, it has held two meetings, and its inspectors of examinations have been selected. The three inspectors are Sir Kedar Nath Das, Dr. Tirodkar and Dr. Farquhar Macrae.

As there has been much misunderstanding about the history of the foundation of this council, we are giving below, from the *Statesman* of 2nd July, an extract which appears to us to be an accurate and unprejudiced account of the sequence of events.

Until 1922, for about 40 years, the Medical degrees granted by the Universities of British India were recognized by the General Medical Council, largely no doubt because the Medical Faculties were staffed by members of the Indian Medical Service, with whose qualifications and knowledge of the standards which obtained in Britain they had reason to be satisfied.

At this time there was some outcry in England about the lack of any fall in maternal mortality and the question of proper education in midwifery was very much in the public eye. This led to an inquiry into the training in this subject in India, and Sir Norman Walker, at that time Chairman of the Examination Committee of the General Medical Council, came to India to investigate the matter.

The conditions in Madras and Bombay were found to be such as to ensure suitable training in this subject but at Lahore, and Lucknow and, though to a less extent, in Calcutta, owing to the purdah system, they were found to be unsatisfactory. As a result of his advice, arrangements were made for students from these three Universities* to go elsewhere to obtain their training in midwifery.

INSPECTION SYSTEM

The conditions at Madras were so satisfactory that unconditional 'recognition' was granted to graduates from that University; but with regard to the other five recognition was only given for one year, and that only on condition that they should agree to be 'inspected' by some one on whose reports the General Medical Council could rely.

For the purpose of this visiting, inspecting and reporting, Col. Needham, I.M.S., was selected, and in

order that he should be fitted for his work arrangements were made that he should visit and investigate the conditions of medical education in America and in Britain. It was also arranged that he should attend at final examinations in Britain so as to familiarize himself with the standard required there before the Graduates or Licentiates were eligible for admission to the Medical Register kept by the General Medical Council. (It should be made clear here that in England the minimum standard both of education and examination for Licentiates and Graduates was exactly the same).

For five years the Universities of Lucknow, Allahabad and the Punjab and Bombay were 'recognized' by the General Medical Council, as a result of Col. Needham reporting that, while the standard was not equal to that at Home, yet such progress was being made that 'recognition' for a further period of one year, subject to further inspection and report, should be given.

In the case of the University of Calcutta the same course was adopted, except for two years in the middle of the term when they refused to be inspected, and their graduates for these years automatically ceased to be eligible for admission to the Medical Register kept by the General Medical Council. At the end of these two years the University asked for inspection and their graduates were again restored to the Register.

YEAR-TO-YEAR 'RECOGNITION'

In 1927 at the request of the Secretary of State, the General Medical Council sent Sir Norman Walker again to India to report to them on Medical Education there. He went with Col. Needham and saw the conditions in the various Universities and found that in all except Madras there had been progress since his previous visit, and advised in this fashion to the India Office. The condition at Madras (which owing to illness he had not been able to visit during his previous visit) was not considered to be sufficiently good to justify 'recognition' without inspection, and Sir Norman advised the General Medical Council to continue the 'recognition' of all six Universities only from year to year subject to satisfactory reports from the Inspector. This was continued until the beginning of 1930, Col. Needham being seconded, and visiting and reporting on the education and examinations.

In his report to the Secretary of State, Sir Norman had advised the formation of a Medical Council in India similar to that in Britain which would undertake the overseeing of medical education and examinations in the Universities of British India, so that there would be no necessity for the General Medical Council even appearing to interfere with the autonomy of these Universities. As a matter of fact, on two occasions, some years before, Bills had been introduced by unofficial members of the Legislative Assembly; but largely because of Provincial jealousies (Medical Education being under the Montagu-Chelmsford Scheme a subject for decision by the Provinces) these never came to anything.

For two years after Sir Norman's visit the inspection and year-to-year 'recognition' was continued, but in the Autumn of 1929, notwithstanding repeated warnings as to the consequences which would follow, the Standing Finance Committee refused the grant necessary to enable the 'inspection' to be carried out.

RECOGNITION REFUSED

Under the Acts (1859 modified in 1886) which constituted the General Medical Council in Britain they are held bound to satisfy themselves that the minimum standard of education and examination is maintained before they can put the name of any licentiate or graduate on their Register. As evidence, that such a minimum standard was being maintained in the Universities of British India, was thus, by the action of the Finance Committee, taken away they had no alternative but to refuse recognition to graduates from these Universities after February 1930.

* This plan, we understand, was not put into effect in the case of the Calcutta University, but there was some reorganization of the existing arrangements for practical teaching of midwifery.—Editor, I.M.G.

The Government of India, knowing as they did that this decision automatically prevented graduates from Indian Universities not only from being eligible for certain posts in the Government service, but also from being able to practise in England and such colonies as the Malay States, Natal and Ceylon, where many Indians are employed, tried various ways of getting out of the impasse pending the formation of a Medical Council in India.

The principal plan adopted was to appoint distinguished members of the Indian Medical Service with experience of medical education and examinations to visit and report on the examinations at the Universities.

These reports the General Medical Council refused to accept as satisfactory evidence such as would justify them in according 'recognition' for several reasons.

(a) They held that individual reports on individual examinations did not ensure that the standard required by the various inspectors could be so uniform as that given by one inspector visiting and reporting on all of the Universities, and that such uniformity of standard was essential.

(b) They felt that as the Inspectors were themselves teaching and examining in the Universities it would be rather invidious for them to report adversely on the teaching and examination in other Universities, and that they were bound to be unconsciously influenced in their opinions by this fact.

(c) Though this did not bulk so largely in their minds, their decision was also influenced by the fact that none of the inspectors who had been appointed had recent experience of the standard required at the examinations in Britain.

EXPERT FROM ENGLAND

Meantime, efforts were made to get an Act passed to constitute a Medical Council for India, but largely because of inter-provincial jealousies, and a misconception as to the status of Licentiates of the various Medical and Surgical Corporations in Britain (all of which were granting diplomas in Medicine long before Medical Education became a function of the Universities) these were unsuccessful until the Autumn of 1933 when the Indian Medical Council Act was passed.

The Government of India thereupon asked the High Commissioner for India in London to make an effort to get a medical man from Britain with experience in reporting on both medical education and examinations to come out in the capacity of Secretary to the Council.

It so happened that Dr. Farquhar Macrae who had retired from practice had for four years been engaged in reporting to the General Medical Council both on examinations and education, and after investigation of his qualifications the High Commissioner recommended to the Indian Government that he should be offered the position. This was done and he accepted and arrived in India in February.

Current Topics

Flatulent Dyspepsia : Its Causes and Treatment

By JOHN HENDERSON, M.D., Ch.B., F.R.F.P.S.G.
(Abstracted from the *Practitioner*, Vol. CXXXII, No. 4, April, 1934, p. 425)

FLATULENT DYSPEPSIA is largely a 'lay' term with a wide reference to all forms of gastric disorder in which flatulence is a prominent feature, and in which there is not any discoverable organic lesion. Even medically it is commonly used with similar significance, as it is a diagnosis which meets with ready acceptance by the patient and the patient's relatives. Flatulence, or the presence of an excess of gas in the gastro-intestinal tract, may occur simultaneously in the stomach and intestine, though in the majority of cases it is confined to the stomach. Obviously it may result from: (1) An excessive production of gas of some kind from chemical changes, usually by fermentation or by putrefaction; (2) an excess of air swallowed—ærophagy in some form; (3) deficient elimination or absorption.

Ærophagy.—In ordinary circumstances in health a certain amount of air is swallowed: (1) With food, more with fluids than solids, and more when feeding is hurried and mastication deficient; (2) with saliva, and hence more when for some reason this is excessive. In certain diseases also associated with pain, particularly when this pain is paroxysmal as in cardiac disorders, angina pectoris, and various types of colic, especially hepatic, the cessation of pain is often associated with copious eructations. The origin of the flatulence here is doubtful, but is most likely air swallowing.

The term ærophagy here is used to describe a condition which may arise from an acquired habit, unconsciously, particularly in those with some form of digestive difficulty, or more classically at the present day it refers to the several types which occur independently of dyspepsia and as part of a pure neurosis. In the former type the patient has a feeling

of discomfort or distension in the stomach, which is felt to be due to 'wind', and which he attempts to ease by eructation. As there may be little or no excess of gas the attempt is unsuccessful and results in the swallowing of air. Repeated attempts, however, result in such an accumulation of air that eructation is ultimately successful and apparent relief ensues for a time. This may become a habit. In the latter and more severe type there may be severe attacks of noisy eructations following one another in rapid succession, perhaps going on for hours or days, and in some such cases mental excitement produces a paroxysm. Large quantities of air are swallowed with saliva until the stomach is distended, when spasmodic movements of the diaphragm are set up which pump the air backwards and forwards between the stomach and œsophagus, till finally it is expelled with a noisy report. The whole process may be clearly observed in some cases, but in others the air swallowing may not be perceptible. The gas thus eructated is, of course, odourless and tasteless. This condition is more common in hysterical women and neurasthenics, but has also been observed in children, and several instances have been noted in one household. These cases would appear to be rather on the increase, as I have seen several within recent weeks.

Deficient elimination of gas will occur whenever there is diminished absorption owing to catarrhal conditions, or to portal obstruction in hepatic cirrhosis, or cardiac failure with consequent backward pressure, or when there is an atonic dilatation. Swallowed air and the gases of fermentation are insufficiently absorbed with the result that flatulence may become a troublesome feature.

With the increase of accuracy in diagnosis in gastric disorders due to modern methods of examination the term dyspepsia has acquired a much more limited significance, and many cases formerly grouped as acid dyspepsia, or atonic dyspepsia, are now recognized as early stages of gastric ulcer or catarrh, as mild cases

of acute gastritis, or as symptomatic of general affections such as anemia or renal disease. Apart then from definite organic lesions in the stomach which give rise to dyspeptic symptoms, two groups of cases are separable: (1) Functional dyspepsia, *i.e.*, without obvious pathological changes; (2) nervous dyspepsia, associated with definite nervous temperament or with definite neuroses, such as neurasthenia or hysteria. The distinction between these is, of course, somewhat arbitrary, as both are based on disturbances of function, either motor, sensory, or secretory, or a combination of these.

So far as flatulence is concerned, it is almost entirely found (at least in a well marked degree) in cases in which the disorder is an error of defect. Hypochlorhydria, or sub-acidity, is met with in those who follow sedentary mental occupations, especially towards middle age, in women towards the climacteric period, or associated with neurasthenia or hysteria. Accepting this as the special type of flatulent dyspepsia for the purpose of this paper, the most constant symptom is a sensation of fullness and oppression in the epigastrium and under the left costal margin, which may amount to actual pain. This comes on soon after the taking of food, and persists often for most of the day, with flatulence, headache, drowsiness, and constipation. Vomiting is not a feature, but when it does occur it affords a welcome relief. The tongue is pale, flabby, broad, and indented by the teeth. The distension of the stomach by gas may cause upward pressure on the diaphragm, and this in turn may give rise to cardiac embarrassment with palpitation and fluttering in mild cases, attacks of pseudo-angina in others, and even may induce an attack of true angina or asthma in those liable to such paroxysms. The condition may be partially relieved by gaseous eructations. Full inquiry should be made, as in all cases of disturbed digestion, of the time taken over meals, the nature and the quantity of food taken, and the regularity of feeding. Deficient teeth, deficient mastication, and constipation are almost always the prominent features in the history and etiology.

The above condition is often associated with defective motility of the stomach, and may then result in atonic dilatation (*i.e.*, non-obstructive) due to atony of the muscular coat. This tends to be progressive unless the cause is removed. A history of poor general health, chronic dyspeptic symptoms, and obstinate constipation is often obtained. Poor physique, and bad or deficient teeth are almost constant accompaniments. In this form flatulence is a prominent feature, usually with fermentation as the condition becomes more advanced, and a test meal shows the lack of free hydrochloric acid, though the total acidity may be normal or increased owing to the increase of organic acids. An x-ray examination after an opaque meal shows the shape and outline of the stomach, the position of its lower border, and the lack of motility with prolonged retention. Complete absence of free hydrochloric acid in the gastric juice (achlorhydria) is rare in functional or nervous types of dyspepsia, though it is an almost constant feature in cases of chronic gastritis, carcinoma of the stomach, and diabetes mellitus, and is a characteristic precursor or accompaniment of pernicious anemia. The most extreme type, achylia gastrica, in which there is entire absence of gastric juice, both acid and ferments, is rare as part of a pure neurosis. In any case, it is as a rule associated with hypermotility, so that there is little time for gas formation. This condition can only be diagnosed by complete gastric analysis.

The diagnosis of *aerophagy* is not, as a rule, difficult when the physician has an opportunity of observing the patient during a spasm or paroxysm of eructation. The patient collects some saliva in the mouth, slightly flexes the head on the chest, closes the mouth and swallows. Thus the air is forced into the oesophagus, producing a sound which is believed to be an act of eructation whereas in reality it is the opposite. On opening the mouth air is belched forth noisily, and then swallowing and eructation follow closely on one

another. When in doubt the diagnosis can be confirmed by x-rays, under which by suitable arrangements the whole process may be observed in operation.

Treatment

In all cases of flatulent dyspepsia it is safe to say at the outset that success in treatment can seldom be expected if the gastric symptoms alone are considered. Attention should be directed in the first instance to the cause or causes in operation, and these should, if possible, be removed or corrected, and any constitutional condition suitably dealt with. Worry and mental exhaustion are best countered by change of air and scene when this is possible, and in cases in which the neurasthenic or neurotic factor is strong a course of Weir-Mitchell treatment, with isolation, absolute rest, and massage, may be beneficial.

The importance of dental attention cannot be too strongly emphasized, as proper mastication of food is the foundation of all treatment. Bad teeth should be removed, defective teeth suitably treated, and a sufficiency of teeth insisted upon, and generally the proper toilet of the mouth should be stressed. Constipation, which is almost universal in such cases, should be corrected, not by occasional purges, but by regular stimulation of the bowel. In this connection abdominal massage suited to each individual patient is a valuable aid, perhaps supplemented by abdominal exercises. Regular exercise should be advised, avoiding over-fatigue. A short rest both before and after meals is beneficial, though not always possible. Faults of hasty eating, overeating, or overdrinking should be corrected, and the times of meals suitably spaced. It is advantageous to prescribe in detail the diet suitable for each case, as thus both the quality and the quantity can be regulated. As a general rule, all highly-seasoned or indigestible foods should be forbidden, and unless alcohol in some form is considered necessary it is better omitted. Even tea should be weak and used sparingly. The use of tobacco should be restricted, and in some cases (especially where acid is in excess) forbidden.

These are general rules which can be adapted for application to all cases, but with regard to medicinal treatment it is of the utmost importance to avoid indiscriminate drugging, as such patients are only too apt to fly from one remedy to another, and to add a 'drug dyspepsia' to their original ailment. We should discourage at every opportunity the habit which is very prevalent at the present day of what may be termed 'drawing-room prescribing', on the ground that what is suited to the needs of one may be entirely unsuited or even harmful to others. Medicinal treatment to be on proper lines must be directed both to the general and the local needs. Tonics or sedatives may be necessary as the case demands, and the constipation which is an almost constant feature should be regulated by a cascara preparation, either the evacuant given thrice daily in suitable doses or cascara given in a mixture form thus:—

R. Extracti cascarae sagradae liquidi ..	℥iss
Liquoris potassii ..	℥iii
Tincturae nucis vomicae ..	℥iii
Aquam chloroformi ad ..	℥vi
℥ii i.d., a.c.	

I have found magnolax a very useful remedy in all forms of gastric and duodenal disorder, given twice or thrice daily in dosage sufficient to produce a daily evacuation. Further medicinal treatment should be on lines calculated towards correcting deficiencies or neutralizing excesses in the gastric juice in the various types of disorder to which reference has been made. The best results therefore can be expected in those cases only in which a careful gastric analysis has been carried out to provide the necessary data.

When *hypochlorhydria* is present special dietetic instructions should include limitation or exclusion of meats and farinaceous foods, and especially of bulky vegetables, such as potatoes and cabbage, and the exclusion of pastry and other indigestible articles. Fats should

be avoided, though butter may be allowed in moderate quantity. Light, strained soups may be permitted. Meals otherwise should be dry, fluids only to be taken after the meal. Tea, if taken, should be weak. It may be thought advisable in this form to allow a little whisky or brandy. An alkaline bitter mixture given before meals is often valuable in neutralizing organic acidity, and may improve both appetite and digestion by stimulating gastric secretion. Such a mixture may take this form:—

R Sodii bicarbonatis ..	..	gr. xv
Tincturae nucis vomicae ..	..	mv
Infusi gentianae compositi ..	..	ʒii
Aquam chloroformi ad ..	..	ʒi

Hydrochloric acid, with or without pepsin, is essential in such cases:—

R Acidi hydrochlorici diluti ..	..	mxx
Glycerini pepsini ..	..	ʒi
Syrupi aurantii ..	..	mxx
Aquam ad ..	..	ʒiv

To be taken 15 or 20 minutes after meals.

For the relief of flatulence, should it be necessary, sipping hot water, plain or with added carminative as peppermint or cinnamon, may be beneficial, or a few drops of the essential oils may be given on sugar. When the deficiency of acid is greater, as in achlorhydria or achylia, naturally much greater doses of hydrochloric acid are called for, up to ʒii or even more without or with pepsin, with a flavouring of orange juice or syrup, and given well diluted to be sipped during meals. Experimentally it has been found that the individual need for acid in such cases is a variable quantity, so that the requirement for each case may only be arrived at by trial.

Atonic dilatation.—Here the regulations as to diet are similar to the foregoing, but the meals should be in similar quantity as well as dry; the fluids are better taken between meals. Alkaline bitter mixture before meals as before, with acid following, should be employed, but it may be considered advisable to supplement these by a pill calculated to increase the muscular tone of the stomach:—

R Extracti physostigminae ..	..	aa. gr. ʒ.
Extracti nucis vomicae ..	..	aa. gr. ʒ.
Excipient quantum sufficit		
One pill night and morning.		

In this form a daily stomach lavage may be necessary at the outset, and abdominal massage and exercises should be advised. Short-circuiting operations should be reserved only for cases in which the above line of treatment fails to relieve the condition, or for those in which there is marked difficulty in emptying the stomach, as shown by x-rays and evidence of fermentation. Such extreme measures are rarely necessary.

Hyperchlorhydria.—In those cases of hyperchlorhydria which may be associated with flatulence, the diet should consist of light meats and proteins, fish and eggs, but soups are better excluded, as well as all greasy materials except butter in moderation. An alkaline mixture or powder after meals is indicated, and it is advisable to time the dose so as to anticipate the main increase in acidity. This can, of course, only be accurately done with the aid of a fractional test meal, but, as a rule, the most suitable time is a half to one hour after meals:—

R Sodii bicarbonatis ..	..	} aa. gr. xx
Bismuthi oxycarbonatis ..	..
Magnesii carbonatis lev. ..	..
To be taken in water or milk.		

Or this combination may be given in mixture form with sufficient mucilage, and perhaps then supplemented with benefit by the use of a carminative water as vehicle.

In the purely nervous types, tonic or sedative drugs may be required, or special combinations to correct deficiencies or excesses as shown by gastric analysis, but the main line of treatment here is to gain the confidence

of the patient, and, organic disease being excluded, to give him assurance as to recovery.

Ærophagy may call for special treatment. Many cases subside when the true condition is carefully explained to the patient and suitable restrictions are made as to eructations, but in more severe cases more may be required. It may be necessary to isolate the patient and to use disciplinary measures, including the periodic passage of the stomach tube, keeping it in position for several minutes. Actual lavage of the stomach may at times be considered beneficial. It is well to remember that this condition is prone to relapse, and the knowledge that such relapse may call for a repetition of disciplinary measures is often a good corrective for the patient. Belladonna or atropine in careful dosage, with a carminative or sedative vehicle, is at times of service in relieving the actual spasms.

Clinical Manifestations of High and Low Plasma Magnesium

By ARTHUR D. HIRSCHFELDER, M.D.

(Abstracted from the *Journal of the American Medical Association*, 7th April, 1934, Vol. CII, No. 14, p. 1138)

ALTHOUGH a great deal of clinical significance has been attached to variations in blood calcium, variations in blood magnesium have entirely escaped notice. Very little has been known even about what happens when a patient takes an ordinary purgative dose of epsom salt. One observer found that a normal man excreted 28 per cent of the ingested magnesium through the kidneys in twenty-four hours, and another 21 per cent. Using a new and convenient method for the quantitative determination of magnesium in blood plasma and urine, we have found that seven normal men excreted from 40 to 44 per cent (average 42.6 per cent) of the magnesium taken in a single ordinary purgative dose of epsom salt within twenty-four hours after ingestion. However, in spite of the large amount of magnesium absorbed, the concentration of magnesium in the blood plasma (normal, from 1.8 to 2.5 mg. of magnesium per hundred cubic centimetres; average normal, 2.09) is scarcely affected (average increase, 0.24 mg. of magnesium per hundred cubic centimetres; maximum increase, 0.41 mg.). In normal dogs and normal rabbits the percentage of ingested magnesium that is excreted and the concentration of the magnesium in the blood plasma are almost exactly the same as in man, and with corresponding doses by mouth the plasma concentration also remains practically unchanged. In animals the percentage of the ingested magnesium that is excreted in the urine is practically constant, regardless of the dose ingested or of the concentration of magnesium in the blood plasma.

HIGH PLASMA MAGNESIUM (HYPERMAGNESEMIA) AND EPSOM SALT PURGATION

However, when the kidneys are injured, the results are totally different. We have found in animals in which renal injury had been produced experimentally that less magnesium is excreted than normally. The excretion of magnesium is less in animals in which the tubules are more severely injured than the glomeruli (corrosive mercuric chloride nephrosis) than in those in which the glomeruli are injured more than the tubules (cantharides glomerulonephritis). The decrease in excretion of magnesium corresponds quite closely to the decrease in excretion of phenolsulphonphthalein but does not correspond to the alterations in excretion of xylose. We have found also that in nephrectomized animals and in animals with renal, and especially tubular, insufficiency the ingestion of magnesium sulphate causes a tremendous and rapid rise in plasma magnesium, sufficient even to bring them into a state of coma. Coma occurred whenever the plasma calcium reached or exceeded 17 mg. of magnesium per hundred cubic centimetres of plasma. This exactly coincides

with the level at which coma sets in after the subcutaneous injection of magnesium salts.

We have therefore studied the effects of the ingestion of ordinary purgative doses of magnesium sulphate on the plasma magnesium and the general physical condition in a series of patients suffering from renal disease. In all these patients, just as in the nephritic animals, a tremendous rise in plasma magnesium occurred within from four to six hours after an ordinary purgative dose of magnesium sulphate (epsom salt) had been taken by mouth. While one such dose was not sufficient to raise the magnesium concentration in the plasma to the level at which coma sets in (about 17 mg. of magnesium per hundred cubic centimetres of plasma), it often did rise to about two-thirds of that concentration (from 9 to 11 mg.) and a number of the patients did show a decidedly increased drowsiness or even a light coma accompanying the increase in plasma magnesium.

Since a single ordinary dose of epsom salt by mouth can raise the concentration of magnesium in the blood of nephritic patients to two-thirds of the concentration at which coma sets in and since with larger doses it is easy to induce coma in nephritic animals, it seems probable that a few repeated doses of epsom salt would induce coma in the patients. It is therefore most probable that there are every year many hundreds of cases of coma occurring in nephritic patients which are diagnosed uræmic coma but which in reality are magnesium coma caused by the use of epsom salt as a purgative. Since experimental animals could be brought out of this coma instantly and their lives could be prolonged by the intravenous injection of calcium chloride, the intravenous injection of calcium chloride would probably restore such patients to consciousness.

We are not stating, nor do we think, that all or even most cases of uræmic coma are due to magnesium intoxication, but we are merely calling attention to the fact that a condition of coma easily mistaken for uræmic coma can be induced in nephritic patients by epsom salt purgation. Magnesium citrate would unquestionably have the same effect.

Our results in no way contradict those of Blackfan and others who have administered magnesium sulphate intravenously for the control of uræmic convulsions, and for eclamptic convulsions. Since they gave intravenously in carefully controlled doses only sufficient magnesium sulphate to produce subsidence of the convulsions, they stopped the administration as soon as a sufficiently high level of magnesium concentration in the blood had been reached. However, when the drug is administered by mouth and absorbed continuously from the intestine without regard to its concentration in the blood, this level can easily be exceeded.

Since our experiments on animals with renal insufficiency have shown that coma cannot be induced by tremendous doses of sodium sulphate, it would appear that sodium sulphate should be the saline purgative of choice in patients with renal disease.

Our experiments on animals showed also that animals whose plasma magnesium was only slightly raised (to 5 mg. or more) were much more sensitive than normal animals to ordinary doses of morphine. This explains Dr. Osler's old aphorism that 'in severe nephritics and very old persons morphine should be given with caution'. Epsom salt was Dr. Osler's favourite saline purgative and was administered almost as a routine in his wards at Johns Hopkins Hospital.

LOW PLASMA MAGNESIUM (HYPOMAGNESÆMIA)

A form of tetany has been induced in rats that were raised on a diet free from magnesium, it seemed probable that cases showing convulsions or other conditions of increased neuromuscular activity would be encountered clinically in which the plasma magnesium is low.

Two of these were cases of parathyroid tetany. This accords with the experimental results and the clinical observations of others who also found low blood

magnesium in some but not in all cases of parathyroid tetany.

In view of the cases we have seen, it is evident that there is a clinical syndrome associated with low plasma magnesium accompanied by a condition of hyper-irritability of the neuromuscular system, often associated with muscular twitchings or convulsions. These cases are probably more common than has been realized.

At least in the patients whose kidneys are pathologic the twitchings or convulsions can be relieved by the administration of a purgative dose of epsom salt by mouth.

SUMMARY AND CONCLUSIONS

(1) When normal individuals take epsom salt by mouth they excrete about 40 per cent of the ingested magnesium in the urine in twenty-four hours; but the concentration of magnesium in the blood plasma does not rise appreciably.

(2) The concentration of magnesium in the plasma may vary greatly under clinical conditions.

(3) There is a clinical syndrome of high plasma magnesium (hypermagnesiæmia) accompanied by somnolence or coma.

(4) This may be induced in patients with renal insufficiency by the oral administration of one or more purgative doses of epsom salt.

(5) Many cases of coma in nephritic patients, diagnosed uræmic coma, may be simply magnesium coma induced by epsom salt purgation. From such coma patients could probably be awakened by intravenous calcium chloride.

(6) Sodium sulphate is preferable to epsom salt for patients with renal insufficiency.

(7) There is a clinical syndrome of low plasma magnesium (hypomagnesiæmia) accompanied by muscular twitchings or by convulsions.

(8) When this occurs in patients with renal insufficiency, the twitchings or convulsions are relieved by oral administration of epsom salt.

Amœbic Dysentery The Outbreak in Chicago

(From the *British Medical Journal*, 14th April, 1934,
Vol. I, p. 672)

So many conflicting reports of the now well-known outbreak of amœbic infection which commenced in Chicago on 16th August last year have been made that it is a relief to have published by those most directly concerned with it the actual sequence of events. Briefly what happened was this. On 16th August two cases of amœbic dysentery were notified from two hospitals. Inquiry showed that both the patients had fed at a certain hotel where cases of diarrhœa were found to have occurred. On the following day a laboratory was established in the hotel, and 'stools from all the food-handlers were collected and examined, under the supervision of trained technicians who were experienced in the diagnosis of amœbiasis'. The result was that by the end of the month, fifteen clinical cases (we are not told if these were actual cases of dysentery) and eleven carriers were discovered among 364 food-handlers, a percentage of about 7.1. The situation was watched during September, and no new cases arose which could not be attributable to earlier infection.

PUBLIC HEALTH MEETING AT INDIANAPOLIS

On 9th October attention was called to this incident at the annual convention of the American Public Health Association in Indianapolis. It was given publicity in the local press, with the result that on the same day it was brought to light that two members of a family in Indianapolis had been affected with amœbic dysentery after a visit to the hotel in Chicago. Further inquiry in this city disclosed a total of eight such cases. This discovery, and the appearance of some new cases at the hotel, led to the institution of further examination

of the staff and the dispatch of a questionnaire to 16,000 persons who had stayed at the hotel during June, July, and August 1933. This last inquiry, which was followed up by long-distance telephone or telegram urging immediate medical care for those afflicted, resulted by 8th November in the discovery of thirty-five cases of 'diarrhoeal disturbance' among those 16,000 guests who had stayed at the hotel.

'It was then decided that the situation was sufficiently serious to justify the issue of a general warning to the Press.' This was carried out on 9th November, and again on 10th November, while on 14th November a special broadcast was made over the N.B.C. network from coast to coast and in Canada, with an appeal to those suffering from intestinal disorder to see their doctors, and to physicians to be on the look out for 'amœbic dysentery'.

INVESTIGATION OF FOOD AND WATER

The second examination of the food-handlers at the hotel, completed by the middle of November, revealed the fact that, though those detected at the first examination had been removed, others were found to be infected who had not been so at first. It was therefore concluded that the control of food was not checking the infection. Examination of the water supply was then undertaken, and it was found that there were serious defects which might permit of the contamination by sewage of food and drinking-water. Another hotel is now mentioned in which a very serious condition of the water system was discovered, and in which a high incidence of amœbic infection also occurred. Finally, it is stated that in the hotel first considered five surveys of food-handlers and two surveys of non-food-handlers had been completed by the end of January. The result was the discovery of infection in 165 food-handlers and in 141 non-food-handlers out of approximately 1,100 employees. Exact details of these examinations are not given, but it may be presumed that the food-handlers found to be infected at any time were at once removed and replaced by others, but we are not told if the latter were known to be uninfected individuals. Furthermore, we do not know if the well-attested fact was recognized that, owing to the intermittency of the appearance of cysts in the stool, a single examination of a group of people yielded a number of carriers which is only about one-third of those which can be discovered by repeated examination.

The broadcast mentioned above resulted in the report of 721 clinical cases of amœbic dysentery in 206 cities, including Chicago, as apparently originating from the same source. In addition, 1,049 carriers of *E. histolytica* were brought to light in Chicago, presumably in places other than the two hotels, by the investigations. A general laboratory survey of all the principal hotels and larger restaurants was also made, but no parallel to that of the two original foci could be found, though it is reported that in an industrial plant, in Chicago employing 375 workers a connection allowing river water to contaminate the water supply was made in December. This was followed shortly after by an outbreak of diarrhoea. Investigation by the Board of Health revealed seven cases of amœbic dysentery, seventy-one carriers of *E. histolytica*, and three cases of typhoid fever.

REPORT OF THE SPECIAL COMMITTEE

The interest taken in the infection was so great that the President of the Board of Health eventually appointed a special committee to examine the situation, and it met in Chicago from 22nd to 26th January inclusive. It reports that until 1933 amœbic dysentery had not figured largely in the morbidity and mortality reports in Chicago, or indeed in any city in the United States. The outbreak in 1933 embraced about 800 reported cases, most of which became apparent in cities other than Chicago. A large majority of these were traced to two hotels as probable sources of

infection. The report says that the unprecedented nature of the outbreak must be borne in mind, for until this time amœbic dysentery had not been known to occur as an epidemic disease in a civil population. Though this is the case, the examination of the records and laboratory materials, preparations, and cultures led the committee to the view that the cases diagnosed as infected with *E. histolytica* were actually of this nature.

It is noted that the examinations (presumably single ones, and not repeated ones as made at the hotel) carried out have shown that 3.9 per cent of employees in hotels and restaurants in general in Chicago are carriers of *E. histolytica* or suffer from amœbic dysentery—an incidence which is about equal to that among the population of the United States in general. In the hotel first examined the percentage of infection among the employees was at times as high as 18 per cent, that among the food-handlers being approximately the same as that among those with other duties. This fact suggested that structural defects, either permanently or intermittently operative in the two hotels, were associated with an unusual incidence of amœbiasis. Such defects, the committee states, no doubt exist in other hotels, but only special circumstances bring them into play to cause a severe epidemic. Such special circumstances are necessary, for it is known, the report says, that extremely large doses of *E. histolytica* have to be administered to both man and animals to produce infections comparable with those observed in this epidemic, in which the incubation period was short, the lesions were severe, and the exposure often minimal.

DO AMŒBIASIS EPIDEMICS OCCUR?

The above reports raise once again the whole question of the method of spread of *Entamoeba histolytica* and of whether actual epidemics of amœbiasis arise. At the commencement of the war it was thought that amœbiasis was accounting for practically the whole of the invaliding from Gallipoli. This was due not only to lack of experience in the diagnosis of intestinal protozoal infections, which is notoriously difficult, but also to a misconception regarding amœbiasis on the part of those handling the cases. They considered it an acute infectious disease like cholera or bacillary dysentery, whereas actual amœbic dysentery is rather the periodic dysenteric manifestation of a chronic amœbic infection. It seems not improbable that the actual dysentery is caused or stimulated by some intercurrent bacterial infection, or other irritant, acting in a carrier, so that one is led to wonder, in the incident recorded above, whether, assuming that the diagnosis was correct, the occurrence of two cases of amœbic dysentery on one day in persons who had fed (we are not told when) at the same hotel is sufficient justification for the assumption that the amœbic infection had actually been acquired there. Even though inquiry had elicited the fact that there were cases of diarrhoea at the hotel, the immediate establishment of a laboratory there appears to indicate that amœbic dysentery was being looked upon as an acute infection apt to spread rapidly. Such a procedure is perhaps surprising to those who, from a long experience of the disease and its diagnosis, both in the tropics and in more temperate climates, have never observed that amœbiasis spreads rapidly in epidemic form from case to case. One is also led to wonder how in a city like Chicago, where amœbiasis is said to have appeared so rarely in the past, it was possible to find, at such short notice, technicians with the necessary experience to carry out the examinations accurately. The laboratory nevertheless returned a high percentage (7.1) of carriers of *E. histolytica* in this hotel, and later in another hotel and in an industrial plant; finally, 3.9 per cent of carriers were detected among employees of other hotels and restaurants in Chicago. Allowing for the fact that the repeated examinations at the first hotel were bound to yield a higher percentage of carriers than the fewer examinations of employees at other places, it

seems clear that the action taken, whether justified or not by the circumstances, has revealed a widespread carrier condition in the city—so much so, that there is some ground for asking whether some of the individuals who were supposed to have been infected in the two hotels may not already have been carriers before coming to Chicago, while others may have become so at other places in the city, where, in the warm season, they must undoubtedly have taken food and drink outside their hotels. It is notorious that, under the conditions of tourism, diarrhoeic disturbances are far from uncommon.

A SUGGESTION

From all that is known of experimental infection and the dosage of cysts required to produce it, it is difficult to imagine any form of contamination of food or water with fecal matter, even when direct connections exist between the water supply and sewage system, which will allow people complacently to ingest the enormous doses of cysts required to cause amœbic dysentery, and to lead to the development of amœbic infections to the extent they are supposed to have done after very short incubation periods, which in some cases, we are privately informed, were not more than two days.

On the other hand, bacterial infections, or food poisoning, or other intestinal irritants, may light up amœbic infections or even give rise in carriers to dysenteric symptoms. Therefore, though infections were undoubtedly taking place in the hotels examined to an undetermined extent, as well as in other parts of the city and in the United States generally, it would appear from the data available hardly necessary to revise our conception of amœbiasis in the direction of looking upon it as an alarming disease demanding immediate preventive measures such as are necessitated by sudden and unexpected outbreaks of cholera, bacillary dysentery, or food poisoning. A possible explanation of the outbreak is that the immediate action taken, and the publicity given to it, aroused interest in an incident which otherwise would have passed unnoticed, and brought to light a condition of affairs in Chicago which had been in existence for a considerable time.

Pulmonary Tuberculosis Recent Types of Operation

By HOWARD LILIENTHAL, M.D.

(Abstracted from the *Journal of the American Medical Association*, 14th April, 1934, Vol. CII, No. 15, p. 1197)

TUBERCULOSIS is a disease that begins locally and is followed by general dissemination. In this respect it resembles many other infectious diseases as, for example, syphilis, and like syphilis, it destroys tissue, leaving scars or fibrosis when the infection has been overcome. The local destruction by either tuberculosis or syphilis may produce mechanical conditions that are permanent even though the disease itself is no longer active. One example is stricture of a hollow viscus. These residual disturbances may require operations for relief or even to save life.

Since the discovery of reliable methods of killing the spirochete, the need for operations in syphilitic disease is seldom felt. On the contrary, deformities left by tuberculosis of the lungs are still frequently encountered and form the principal group that calls for operative therapy. The cure of tuberculous cavities with their dangers of locally spreading the infection, of septic absorption or of mixed bacterial contamination and of further destruction of pulmonary tissue is the chief object of operative procedure.

The day must come when a direct biologic attack on the bacillus of tuberculosis will result in the control and, perhaps, in the final disappearance of the disease but at present one can hope only for an arrest of progress with cicatrization with or without calcification or ossification, which in ordinary circumstances prevents the continued advance of the malady.

Methods employed in the treatment of this disease may be divided into three main groups:

A. Medical treatment, so called, which might better be described as the non-operative treatment by hygiene.

B. Operative treatment.

Both of these have for their object the resulting 'cure' by rest and by scar formation of the least harmful character.

The third method, which is now under intensive investigation, is:

C. Biologic treatment.

Since this paper will deal solely with operations, most of them comparatively new, I will not discuss the medical treatment, including hygiene, voluntary rest, and the like, nor will I touch on the biologic therapy of the future.

EXTRATHORACIC PROCEDURES

Of the extrathoracic procedures, the most common is that of paralyzing the diaphragm on either one side or both sides by interrupting its nerve supply.

There has been some question concerning the inhibition of the act of expectoration because of the phrenic paralysis. I have not found this to be the case but rather the opposite, since the paralyzed diaphragm in coughing is pushed violently upward by the compressed abdominal viscera.

Paralysis of the diaphragm, by attacking the phrenic nerve, may be brought about by (1) contusion, (2) injection, (3) division, (4) resection and (5) avulsion.

If the temporary effects of the contusion of the phrenic nerve by crushing with forceps wears off too quickly, Douglass states that a second contusion may be performed with little difficulty through the scar of the former incision. He has also affirmed that phrenic neurectomy can be regarded as successful only 'when the x-ray film no longer reveals a cavity and when the sputum has been negative on concentration for at least three successive months'. This definition of the success of plurenicectomy seems rather rigid when one considers that tubercle bacilli in the sputum may come from a lesion, perhaps a very small one, in the opposite lung.

In general, the sole method by which the permanent arrest of the disease can be demonstrated is by roentgenograms. I agree with Fales that if after six months of roentgenologic observation there is no visible activity or change, the disease may be regarded as stationary or arrested.

In considering these valuable procedures on the phrenic nerve, much has been said regarding their harmlessness and perhaps too little concerning untoward effects that are occasionally though rarely observed. Truesdale of Fall River referred to the effects of gastric dysfunction by dislocation of the stomach. This had usually been noted after left-sided operations, but recently disturbances on the right side have also been observed. In one of my own cases in which posterior apicolysis had been preceded for some months by phrenic neurectomy, the patient had serious abdominal symptoms with vomiting which necessitated attempts at gastric lavage. Four surgeons and one gastrologist attempted to pass the stomach tube, on every occasion without success. The tube entered the stomach cavity only once and was instantly expelled. All other attempts were futile, both with the ordinary stomach tube and with the intranasal Levine tube. Later on when the patient was convalescent (without lavage) a roentgen examination of the esophagus and stomach revealed no abnormality of the former but a transverse position of the stomach and, with the rising of the right diaphragm, apparently an angulation of the pyloric region, which probably accounted for the acute dilatation with vomiting, regurgitation and belching.

Phrenic nerve avulsion is the most radical method and on the whole is the most generally applicable. The approach that is oftenest employed is through a transverse incision about an inch or more above the clavicle,

where the nerve, when normally situated, can be easily found as it passes downward and inward across the anterior scalene muscle. The exposure which I employ has the advantage that the resulting scar is almost invisible and that identification of the nerve is easy. The incision is made through the skin on the clavicle—not above it—and it extends from the external attachment of the sternocleidomastoid muscle along the clavicle for an inch or even two, for I find it advisable sometimes to carry the inner portion of the approach a little mesial to the edge of the muscle. With careful blunt dissection and resection, the subclavian triangle is exposed. One retractor above and one mesial are necessary, but no retraction is required below because the clavicle is, of course, immovable. The nerve will be seen on the anterior scalene muscle running downward and inward. It should be bluntly raised and a few drops of the anæsthetic solution injected into it. I usually follow this injection with a few drops of alcohol. The alcohol is injected in order to infiltrate as much as possible the nerve below the point of section in case too short a piece should be removed by avulsion, so that there will be at least an interruption of a considerable part of the nerve. The nerve is then divided in the upper part of the wound, and the lower part is caught in the usual manner and twisted out. The skin is closed with a few metal clips or fine sutures, and if there has not been rough dissection no drain is required. If, however, there has been hæmorrhage or if considerable manipulation has been necessary, I use a temporary drain with a split rubber tube to be removed in forty-eight hours. My dressing is a light pad of gauze over the wound itself and a thick pad in the supraclavicular fossa. This is held in place with a strip of adhesive plaster running from the front of the chest obliquely across the shoulder almost to the spine. If elastic adhesive plaster is at hand, it will assure a springy dressing, comfortable and safe.

In addition to the anomalies that have been described in the literature, there is one that I have twice encountered; namely, the situation of the nerve far beneath the fascia covering the muscle and between the deeper fibres of the scalenus itself.

The size of the phrenic nerve varies much. I have seen it as small as a thick horsehair and in one instance so large that had I not been able to identify it by the patient's subjective sensations I might have thought I was dealing with another nerve, in spite of its characteristic location.

This is not the place to discuss the details of therapeutic effects of the operation; it would take too much time and space. I may state, however, that the low approach to the nerve which I have described makes it less likely that accessory nerve connections will be ignored even though these branches are not seen.

No matter what operation is done there are opportunities for failure or accident, the most serious one being injury to the subclavian vein. The low exposure that I advise has made it possible to see this vessel and form an idea of what is happening to it during the avulsion of the nerve.

I have three times injured the thoracic duct where it enters the subclavian or internal jugular vein, but in none of these cases was there the slightest trouble because of leakage. A small packing firmly compressed by the subsequent dressing was removed in two days with no further leakage. It should be mentioned here that in the cases in which violation of the thoracic duct has been followed by leakage and starvation there has been malignant or inflammatory disease, with dense infiltration of the surrounding tissues, preventing the collapse of the injured duct.

Recently an attempt has been made to produce a depression of the first and other ribs by section of the scalene muscles. I mention this merely because it is a modern operation and comes under the title of this paper. It does not appear to me to be of any real value when compared with the other methods at our disposal, especially the later forms of apicolysis.

After all, it must be remembered that when the first rib has been resected posteriorly, even though only a small part of the bone has been taken away, there is tremendous dropping and rotation of the remainder of the rib, so that it becomes almost parallel with the long axis of the body.

Another extrathoracic method for lessening the capacity of the pleural space is the production of pneumoperitoneum by which both diaphragms are pushed upward. This is particularly applicable in bilateral disease.

It has been noted that in tuberculous women when the terminal months of pregnancy have filled the abdomen and forced the diaphragm upward there is improvement in the pulmonary condition and that after the confinement the return of the phrenic domes to their normal position has been followed by manifestations of recrudescence of tuberculosis.

I have not made use of pneumoperitoneum for this purpose although I have frequently employed it in the roentgen diagnosis of diaphragmatic hernia. I am therefore unable to speak from personal observation.

I have found it prudent not to paralyse the diaphragm before the induction of pneumothorax and have been able to demonstrate clearly by roentgenograms that the paralysed diaphragm is pushed downward by a moderately tense pneumothorax, until it reaches the normal level.

Alexander has devised a method for lessening the excursion of the ribs in respiration by dividing (or otherwise blocking) the intercostal nerves. He does not necessarily reserve this procedure for patients who are so feeble that they cannot withstand thoracoplasty, although he has performed it in cases of this kind. The suggestion is interesting but it does not appeal to me, since it is intended to produce rest alone, with only a minimal lessening of the capacity of the pleura. It probably has its application but the cases must be rare. Then, too, there follows a disagreeable numbing of the cutaneous sensations in the distribution of the divided nerves which is not encountered in thoracoplasty, for no nerves are here blocked or divided. Alexander makes no mention of hemiparalysis of the abdominal muscles, which are supplied by the six lower intercostal nerves. Were these nerves merely cut, the muscular function might return; but with resection or even avulsion this would seem impossible. It is difficult for me to conceive of a patient so ill that when an operation of any kind is considered he could not endure a carefully graded thoracoplasty under local anæsthesia. After all, there must be a well functioning contralateral lung to secure success. Here again it is hardly fair for me to express an opinion, since I have never performed the operation. It is mentioned merely for the sake of completeness and because of the important experimental quality of the work.

OPERATIONS ON THE BONY THORACIC WALL

First, as to the skin incision in paravertebral thoracoplasty. One of the disadvantages, especially in the case of a female patient, has been the extension of the scar high up on the shoulder. Recently Maurer has changed this so that the upper limit of the scar is below the spine of the scapula. By proper retraction upward it is perfectly feasible to resect the upper ribs, including the first. This leaves a space of unmarked skin, permitting the patient to wear a gown with a V-shaped neck.

Probably the most frequent cause of early post-operative death, though the accident may not always have been recognized has been the impairment of respiratory and cardiac function in the contralateral lung by bandages that encircle the chest. No bandage or binder, no matter how loose, should be permitted to envelop both sides of the chest. The surgeon himself should apply the dressing immediately after the operation by holding a narrow gauze covering in place with adhesive plaster, which should not pass farther on the well side than the spine and in front

to the distal edge of the sternum. The lower half of the thoracoplasty may, however, be held firmly by adhesive plaster, passing from the midthoracic spine obliquely downward and forward across the abdomen to the opposite bony pelvic region. Compression of the diseased side can thus be secured without the slightest impediment of the motion of the opposite hemithorax. For this purpose I use a wide strip of the heavy adhesive strongly elastic material known by the trade name of Elastikon. To the ends of this material pieces of ordinary adhesive plaster of equal width should be stitched to prevent the edges from curling up. A support of this kind may be left in place for many days and the dressing can be changed by lifting the plaster away from the gauze beneath.

The various splints and braces that have been recommended for this purpose are to my mind too complicated and uncomfortable.

In posterior thoracoplasty, a few points worth remembering are the following:

Occasionally the compression or collapse may not appear to have been successful even after a few months, the ribs uniting by bony bridges from end to end instead of dropping downward as they should. In these cases other resections should be made. The method is a good one but the second incision is not necessary as a routine. Years ago I operated in several cases by incisions through the original posterior scar, an almost bloodless procedure. The anterior parts of the ribs were thus easily found by dissection and anterior retraction. It has not been difficult for me to take away as much bone as I desire, even to the costal cartilages, without the complication of a second incision, and with complete mechanical success.

Sometimes there is striking improvement and even disappearance of bacilli after an operative result not anatomically perfect. This is doubtless brought about by a stiffening of the thoracic walls with consequent rest. Further thoracoplasty may be considered if symptoms of disease recur.

Another procedure that I find to be a decided improvement on the older methods is the combination of posterior apicolysis with first stage thoracoplasty, the anterior and axillary routes being avoided. I now regularly perform posterior apicolysis at the first session in thoracoplasty. I make the original incision downward and then around the scapula, which is finally mobilized. The operator can carefully strip away the apical parietal pleura, push the lung downward and effect the compression of any ordinary cavity in this region. Those with calcified walls will be referred to later.

Rather than use a wax, paraffin or other rigid filling for this extrapleural cavity, I much prefer a method, which I have several times described, namely, packing with crumpled rubber dam. One end of the rubber dam packing is led out at the lower angle of the wound, the rhomboid muscles are firmly sutured and the skin is closed over all except the drainage opening below. In from three to five days or longer, if the packing is well tolerated, the dam may be removed and replaced by a soft rubber tube of good size (about 30 French). There will be discharge for some time, but gradually healing of the extrapleural cavity by granulation will occur and the walls will be drawn in permanently obliterating the cavity. There is no tendency for the lung to rise to its original place in the thorax. Should thoracoplasty of the lower part of the chest be necessary, this can be done at another time through an incision connecting with the mesial part of the first one.

In any operation for collapse or even compression of the whole or a part of a lung, signs of cardiac distress may appear because of dislocation of the mediastinum with its contained vital parts. Cyanosis, dyspnoea or other alarming symptoms should be the signal for removal of the packings or of the pressure from without. Relief will almost certainly follow.

The rubber dam packing will increase the volume of the extrapleural cavity in four days, from double to treble the size that was present at the end of the operation.

TRANSPLEURAL OPERATIONS NOT ON THE LUNG

The commonest transpleural operation not on the lung is of course the induction of artificial pneumothorax. This procedure is so well known that it is unnecessary to go into details. The value of this therapy has been greatly enhanced by the brilliant invention of the operating thoracoscope by Jacobæus, with its comparatively safe division of adhesions which would otherwise nullify the effects of the pneumothorax. The section of these adhesions by the electric cautery with its obscuring smoke and danger of infection or hæmorrhage when pulmonary tissue happens to form a part of the adhesion has been largely supplanted by operating with a coagulation current, which is smokeless and which will minimize the hazard. Several new instruments of this type have been devised, but the one that has impressed me most is that of Dr. Louis R. Davidson of New York. It requires but a single opening through the chest wall instead of two (one for observation and one for the cautery).

It has been stated that adhesions in the posterior part of the pleural space are difficult to reach, especially those which are wide and flat. I question that it is worth while to try to divide adhesions of this kind, and yet occasions may arise in which it may be justifiable. When this cannot be carried out through a single thoracoscopic opening in the chest I would suggest that, as in Jacobæus's original operation, another opening more advantageously placed can be made for the purpose of dividing the adhesions under the guidance of the eye at the telescope in the original thoracic wall perforation. Eloesser of San Francisco has gone so far as to divide adhesions, using the approach of actual wide thoracotomy and closing the chest after the adhesions have been divided between ligatures. It has always appeared to me that thoracoplastic procedures would perhaps be safer than this method and yet I can understand how even this radical step may eventually prevent permanent loss of function in healthy lung, which might otherwise be sacrificed in destroying the function of the diseased part.

The tendency of modern surgery is to conserve the breathing space of a lung when only part of it is hopelessly diseased.

To return to the discussion of uncomplicated artificial pneumothorax, a special danger may be here mentioned. I refer to dislocation of the mediastinum, to which I have already referred.

A means for combating this annoying complication was recently called to my attention. If deviation appears after the induction of pneumothorax of a comparatively low tension, it should be regarded as a danger signal and measures should be taken to stiffen the mediastinum before proceeding with any further collapse therapy. Berck has gone so far as to make experiments on the mediastinal space itself to produce rigidity, but this seems to be an operation of too great magnitude and peril. Dr. Herben has shown that the injection into the pleural sac of an aseptic irritating substance, such as gomenol and oil or liquid petrolatum alone, later to be withdrawn, has a tendency to produce pleural thickening and the much-to-be-desired rigidity.

Two contrasting cases of my own have impressed this strongly on me. The first patient, operated on years ago by thoracoplasty, immediately after the procedure became cyanotic and in danger of death; loosening the adhesive plaster dressings relieved the condition, but immediate perfect collapse was thereby prevented.

The other patient was a young woman on whom thoracoplasty had been contemplated but in whose chest Dr. Herben recognized dangerous mediastinal mobility after only moderately tense pneumothorax. This was overcome by temporary oleothorax with

gomenol. When the mediastinum became rigid I succeeded in achieving good thoracoplastic obliteration of the diseased lung, with final disappearance of all symptoms and with absence of bacilli from the sputum.

OPERATION OF THE LUNG ITSELF

I now come to the consideration of the more radical intrapleural measures. These are mainly operations on the lung itself and I shall mention first the direct drainage of cavities. There are two principal reasons why this should be performed; first it should be performed when the cavity harbours mixed infection which becomes dangerous to life. The mere presence of tuberculosis as a primary factor should not prevent the treatment of such a cavity as if it were a non-tuberculous or even a putrid lung abscess. The first case in which I had recourse to this operation occurred a number of years ago. The patient had a large cavity in the upper central part of the right lung, and after the first stage of thoracoplasty there was high fever and great distress because, apparently, the compression of the thoracic wall had impeded emptying by way of a bronchus. Nearly three weeks later I realized that unless direct drainage was accomplished my patient would lose her life. Therefore, with considerable misgiving, I performed pneumonotomy and drained the cavity fearing, as was the general belief, that because of the tuberculosis the resulting fistula would become permanent. There was immediate relief and in due time the thoracoplasty was completed. Contrary to my fears the fistula closed and the cavity has had to be opened twice since then, the last time only a few months ago when the entire roof was removed and the wound treated by packing. So long as the cavity is open the patient is comfortable but if it closes there is cough with distressing asthma. At the present time the hollow seems to be obliterating naturally and I have great hope that this troublesome case will eventually terminate happily. At any rate the woman is alive and active nearly ten years after the original operation.

Since then I have opened other similar cavities and feel convinced that, when there is a great quantity of sputum and the surgical compression from without cannot be attained, it is far safer in the presence of a healthy contralateral lung to drain freely through the chest wall rather than to subject the individual to the dangers of cough and probably spill-over infection.

Cavities with calcified or ossified walls but with large secreting surfaces with profuse expectoration, whether bronchiectatic, multiple or single, form a very serious and difficult class. The usual extrapleural operations are inadequate, and drainage through the chest wall may leave permanent disability.

At the 1933 meeting of the American Society for Thoracic Surgery, Dr. Harold Neuhof presented a method for the collapse of those cavities in which it can be demonstrated that there is no free space between the two pleural layers. He incises the layers covering the abscess until he reaches a cleavage plane beneath which there is a collapsible wall. Then with careful manipulation he obliterates the cavity and holds the compression by packings, covering these with mobilized periosteum as well. While I have not attempted this procedure, I believe it may have an important place in thoracic surgery.

As a last resort, especially in the bronchiectatic cases, it seems to me that resection of the rigid walled cavity should be done either at one sitting or in divided stages according to the conditions encountered. Indeed, I feel that eventually resection of the lung will become one of the operations of recognized worth in certain cases of localized pulmonary tuberculosis. Thus far, though I have resected many pulmonary lobes for suppurative disease, I have not had the opportunity to apply the principle in cases of phthisis.

ELECTROSURGERY

Another new and important adjunct in operations on the chest wall is electrosurgery. When properly carried

out the electric incision of the skin insures aseptic conditions unobtainable by the ordinary instruments. The tissues must be divided with a quick sure stroke, so that cell destruction along the walls of the wound may not be so great that healing will be delayed. There is another distinct advantage in the small number of hemostatic ligatures, the blood flow from vessels of small size being checked by coagulation through hemostatic clamps. I have performed a secondary complete paravertebral thoracoplasty with resection of ten ribs without the application of a single ligature. There was primary union throughout. Those who are interested may care to read a recent article which I contributed on this subject.

Electrosurgery in thoracic disease should be confined to the chest wall, for if it is employed within the pleura and especially near the heart there is danger that the muscle of that organ may be made to contract abnormally, with fatal result.

EMBOLISM AND MASSIVE COLLAPSE

Among the dangers always to be considered in any operations on the chest for tuberculosis, two are outstanding. They are massive collapse of the better lung and cerebral air embolism. Bacterial embolism with metastasis to the brain is, of course, always possible, and there is no way in which this can be prevented. The danger of air embolism can be greatly diminished by keeping the patient's head lower than his chest during any operative procedure on the wall or cavities of the thorax. Massive atelectasis in thoracic surgery can be treated, but the accident cannot at present be prevented.

ANÆSTHESIA

With the appearance of tribrom-ethanol as a powerful pre-operative hypnotic, a valuable agent is available which relieves the patient of mental anxiety and excitement and which, when properly given as an adjunct and not as a true anæsthetic, becomes a genuine blessing in many operations on the chest. But there is one important contra-indication, namely, the habitual expulsion of a large amount of sputum; for, in spite of the precaution of pharyngeal suction during operation, the long-continued sleep afterwards is liable to be accompanied by aspiration into the better lung. Therefore I do not use tribrom-ethanol in any case when there is profuse expectoration.

SUMMARY

1. Tuberculosis as a disease is not amenable to surgical treatment. Anatomic conditions of a pathologic and threatening nature resulting from the disease may be treated by surgical procedures.
2. The chief object is the obliteration of tuberculous cavities and the conservation of healthy lung.
3. Operative procedures are divided into: (1) extra-thoracic, (2) operations on the chest wall, (3) trans-pleural operations not on the lung, and (4) operations on the lung itself.

The Enlarged Prostate : Considerations in Advising Surgical Treatment

By J. G. YATES BELL.

(From the *Medical Press and Circular*, 4th April, 1934, Vol. CLXXXVIII, p. 310)

IN advising surgical treatment for the prostatic patient there are four established operations that must be borne in mind, and the selection of the suitable method can be correctly advised only after careful consideration of each individual case. This should entail close co-operation between the general practitioner, who knows much of importance in the patient's way of living and details of general health, and the urologist, who will have particulars of the special function tests and knowledge of the type of gland to be dealt with. In many cases, including patients on the border line of cardio-vascular trouble, as well as those with the

established results of urinary obstruction, the opinion of a physician experienced in the risks and stress relative to these various operations is of great value. A physician, no matter how brilliant, can hardly be expected to say whether a patient would stand a prostatic resection when he has never seen the operation performed, and is ignorant of the shock, hæmorrhage, etc., entailed.

The risks of prostatectomy have led in the past twenty years to the introduction of various instruments intended to remove per urethram portions of the obstructing part of the prostate gland. Owing to the inability to control bleeding and to the 'blind' nature of the operation, results were bad, and justifiably these early transurethral manipulations passed into disfavour. The introduction of the endothermy cutting current as a means of checking hæmorrhage, and the perfection of visual and irrigation systems whereby the cutting and its site can be clearly seen, have brought a change fortunate for the prostatic patient. As with all new operations that are successful, enthusiasm led surgeons to try transurethral resection for every prostate, and by so doing the mortality and complication rate rose rapidly, and the operation was condemned by conservative surgeons. Happily, urologists now agree that there are certain cases likely to benefit most from prostatectomy, and others from transurethral resection, and by careful consideration of each patient individually the right operation may be chosen; it is by a middle course, with caution and experience, that the operation of transurethral prostatic resection has become established as a surgical procedure with most benefit to the patient. There are two methods of transurethral resection—the punch cautery and the endothermy wire-loop resection; this latter is most used in England, the instrument being frequently some type of McCarthy resectotome.

The choice of anæsthetic varies; but for all except some cardiac cases a low spinal anæsthetic, preferably spinocain or percain, is excellent. The writer has used avertin with gas and oxygen in some nervous patients, and where an absolute minimum of anæsthetic is required, it is perfectly satisfactory to inject novocain into the sacral foramina and hiatus; but every now and then this anæsthetic fails to work, and so it is not recommended as a routine. Before any of these it must be emphasized that the mouth must have had attention in the matter of septic teeth, many post-operative pulmonary complications being entirely due to neglect of this.

SELECTION OF OPERATION

Suprapubic prostatectomy remains the operation of choice for a patient who is in good condition generally, and who has enlargement affecting mainly the lateral lobes; all very large prostates are best removed by this method.

Perineal prostatectomy has until recently been suitable for certain fibrous prostates and malignant cases, but has been supplanted by resection, and now it has little indication except for a few very rare cases of cyst, and possibly tuberculosis.

Transurethral prostatic resection.—Fully to appreciate the scope of this operation, one must consider what is actually done. In an average case, tissue is removed varying from one to ten grams in weight from the most obstructing situation; obviously, when the obstruction is a small median lobe or a small fibrous prostate, the tissue removed at 'one sitting' is adequate to relieve the obstruction and the symptoms; but when there are bulky lateral lobes, two or three 'sittings' may be necessary to provide a satisfactory channel; in some very large prostates as many as six sessions at intervals of about ten days may be necessary; and it is obvious that most patients would quite rightly prefer the major operation, involving only one anæsthetic and a shorter stay in hospital, and here prostatectomy should be done unless there is a definite contra-indication.

Transurethral resection is a minor operation in the sense that shock is very slight, and immediate danger in an experienced cystoscopist's hands almost negligible, and the average patient is fit to leave hospital in ten days. Hæmorrhage, reactionary and secondary, is rare, and can be stopped by electro-coagulation, and very infrequently needs packing through an open bladder. The chief complications result from infection, and appear as epididymitis, cystitis, pyelitis and pyelonephritis, and may be very largely avoided by careful pre-operative treatment, especially with adoption of temporary preliminary suprapubic drainage in obviously infected cases and by careful after-treatment, ensuring that no obstruction occurs to urinary flow through the in-dwelling catheter left in the urethra for the first four days after resection.

Uremia needs all the precautions exactly as for prostatectomy: the surgeon must know by his clinical examination and renal function tests that the kidneys are adequate; any patient not satisfying these requirements, and even border-line cases, are best advised to have a preliminary suprapubic drainage. The presence of this drainage is additionally useful at the time of operation, as septic complications are rendered more unlikely, and most patients who have a horror of suprapubic drainage will consent when it is pointed out that it is only for a short time, and that risk to life in their case is likely to occur without this precaution.

Suitable types of gland for this treatment may be grouped into four main headings: Middle lobe cases; small fibrous prostates; carcinoma (inoperable by reason of fixity); 'prostatisme sans prostate'. These four groups all give excellent results, and are the 'ideal' cases for resection. Two further groups may be added—the middle lobe with slight lateral lobe enlargement, and lateral lobe cases where for some reason suprapubic enucleation is deemed inadvisable; this includes men of advanced years with short expectation of life, where, surely, to both the surgeon and the patient, a few years of temporary relief must seem preferable to a guaranteed cure at considerable risk after a severe operation.

In the selection of cases, firstly, the history must be taken into account: a gradual onset of dysuria long continued usually indicates lateral lobe preponderance, hæmaturia—a congestive condition likely to be troublesome at resection. A patient of fifty-five years will more frequently prove to be a middle lobe case than will one of seventy-five.

Having decided that the prostate is the cause of the trouble, the first point to establish is whether preliminary suprapubic drainage is necessary. Whether it be followed by enucleation or resection is of no account, and can be decided after the drainage; moreover, the value of digital and visual examination of the bladder, carried out at the preliminary operation, is often of the greatest help in selecting the method suitable.

Obviously infected or uræmic patients present no difficulty as to the course to adopt. It is the patient with tests (daily urine output, residual urine, urea concentration and blood urea) which are only on the border line of safety who may need careful overhaul before it can be decided to operate without drainage. The general appearance is of help: the fat, florid patient with barrel chest and large abdomen is liable to uræmic 'ileus', as well as chest complications, and, always a poor subject for prostatectomy, he is safer with a suprapubic tube at the operation of resection. If the patient has moderate tests, but is thin and sallow, err on the side of caution.

Occasionally a border-line case with a short history and small residual urine can be brought to a fit state for operation by drainage with an in-dwelling catheter for a week; but great care must be taken to avoid infecting the urinary tract, and, on the whole, suprapubic drainage is preferable because of this danger.

The tongue remains a good guide; there is the dry, brown fur, and the raw-beef tongue with shedding of

epithelium, indicating considerable renal damage. There is also a large flabby dyspeptic tongue which accompanies the symptoms of indigestion of early uræmia, and indicates a need for cystotomy. The blood pressure and the state of the arteries are helpful guides to the load on the heart imposed by prostatic obstruction, and must always be investigated.

Urine obtained at the cystoscopic examination must be examined for bacteria, pus and albumen, all of which are indications for drainage.

The length of the interval between drainage and the resection varies from two weeks to six months, until the renal function is adequate, infection has subsided, and, in the longer delays of cardiac and pulmonary cases, until the heart has responded to the improved renal function, or the weather is more propitious to a bronchitic chest.

Rectal examination, while affording information regarding consistency and mobility, fails in the common border-line case to establish the localization of the enlargement with its appropriate treatment, but in very large prostates and in carcinoma this may suffice, although it is the writer's habit to cystoscope all prostate cases.

Cystoscopy is the most certain way of learning the site and nature of prostatic obstruction in each individual case. It has been the writer's invariable practice to cystoscope all prostate cases in the past owing to the frequency of associated conditions such as vesical carcinoma, diverticulum, stone, etc.; and now with the information required as to the nature of the prostate itself, surely this examination must be regarded as a necessary prelude to treatment. It involves no repetition of instrumentation, as residual urine and other tests can be carried out at the same time, and with modern cysto-urethroscopes full inspection of the posterior urethra is done simultaneously. X-ray pictures of the prostate by instillation of opaque fluids into the bladder and urethra are not yet accurate enough to replace cystoscopy, but may be this examination will be perfected shortly.

Permanent suprapubic drainage for prostatic cases is happily now rarely necessary, being reserved for extremely feeble patients unsuitable for a catheter life for reasons of difficulty or pain at instrumentation, who would not tolerate a 'hair cut and shave' in two stages, and for some malignant prostates where the size of the gland or tortuosity and occlusion of the urethra prevent the passage of a resectotome. The comparative mild nature of the operation, with short convalescence entailing small expense to the patient, will result in cases presenting themselves early for treatment before associated cardio-vascular changes are established. The general practitioner will be able to encourage this, with decrease in the morbidity rate and saving in expense to the patient.

To sum up, suprapubic prostatectomy remains the operation of choice for fit lateral lobe cases, and for

all very large prostates; transurethral resection is to be recommended for all other cases except a few feeble patients who must be content with drainage. The choice of operation in the border-line cases of lateral lobe enlargement is made most satisfactorily only after close co-operation of the patient's doctor, the urologist, and an experienced physician.

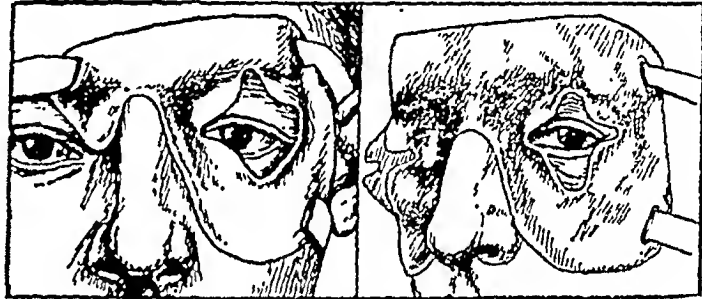
A Protective Mask for Use after Operations on the Eye

By H. KIRKPATRICK, M.B.

LIEUTENANT-COLONEL, I.M.S. (Retd.)

(From the *British Medical Journal*, Vol. I, 10th March, 1934, p. 431)

ACCIDENTAL injury of an eye whilst convalescing from an intraocular operation is an unfortunate complication which is sometimes met with. A protective shield should be (1) light and strong, (2) comfortable to wear, and (3) so constructed that it cannot be displaced by any movement of the patient's head on the pillow. Until recently, in my experience, no available device entirely fulfilled these requirements; but Messrs. Clement Clarke, 16, Wigmore Street, have now made for me a mask which appears to be wholly satisfactory.



The material is a composition resembling celluloid, and the mask is shaped to fit closely the orbital margins and superciliary ridges. The material is sufficiently rigid to afford protection and is yet sufficiently elastic to allow the mask to fit nearly every case. If necessary, however, it can be remoulded for an exceptional patient by softening it in hot water.

There is a bulging prominence in the shield over each eye, and the centres of these prominences are removed to allow proper ventilation. The mask can be used over a dressing instead of a bandage and is tied in position by two tapes which pass round the head, one above the ears and the other below. The shield will serve as a comfortable protective shade after the dressings have been removed. A separate shield for each eye can be used if desired, but a mask which covers both eyes is usually to be preferred.

Reviews

- (1) **HUMAN SEX ANATOMY.**—By R. L. Dickinson, M.D., F.A.C.S. 1933. Baillière, Tindall and Cox, London. Pp. xiv plus 145 with 191 figures. Price, 45s.
- (2) **THE SINGLE WOMAN: A MEDICAL STUDY IN SEX EDUCATION.**—By R. L. Dickinson and L. Beam. 1934. Baillière, Tindall and Cox, London. Pp. xxx plus 469. Price, 23s.

THE traveller of thirty years ago when he took his seat in the train was usually offered by the book vendor a selection of Nat Gould's sporting novels, a volume of detective stories, and possibly a book, with a suggestive title, by Victoria Cross. To-day he will probably

be able to buy his book of detective stories, as these have recently enjoyed another phase of popularity, but for the rest he will be offered a selection of books on sex hygiene, married love, and contraception. Whether this is 'a good thing' for the human race is a matter of controversy, but the general opinion is that it is better for us to have these 'facts of life' forced upon us, than deliberately withheld from us by the universal conspiracy of silence that existed a quarter of a century ago. A middle course would naturally have been ideal, but that is not the way of this world.

During this controversy the medical profession as a whole has 'sat on the fence'. It is not very difficult to understand the reason for this. The position of the

medical man has been a difficult one; despite the fact that he may have M.D., M.R.C.P. after his name, and despite the fact that the sex relations of man and woman are not only a necessary prelude to one of the most disturbing of physiological functions which the human organism performs but are in many other ways intimately connected with health and ill-health, his practical knowledge on this fundamentally important subject may consist only of what he has acquired during his own personal experience, and this may have been very limited; it is not to the enhancement of the prestige of the medical profession that it should be otherwise. The practitioner will probably find that his advice is often sought by patients to whom he can tell nothing that they have not already gleaned from the popular sex literature of the day. He has no literature of his own to which he can turn to repair the gap he has discovered in his knowledge and it will not improve his position in the eyes of his patient if he quotes from the books she (or he) has been reading. Further, he has to accept the statements made in these popular or quasi-medical books because he has not the fundamental knowledge of the anatomy and physiology of sexual intercourse on which he can form any judgment. Little wonder then that many medical men have taken up a reactionary attitude. This is not, we feel assured, the attitude of the medical profession as a whole, and everywhere there are signs that the subject is now being tackled in a scientific manner, but the data on which the literature of a branch of science is founded cannot be built up in a few years. However, fortunately we have men amongst us who were born before their time. This remark is particularly applicable to Dr. R. L. Dickinson who is responsible for a very important series of books published under the auspices of the National Committee of Maternal Health, an American organization. He practised for fifty years as a gynaecologist and obstetrician, throughout which period he made the most remarkable collection of sex histories of his patients, and of notes, diagrams, and measurements of their genitalia. His *Human Sex Anatomy* is based on the latter collection, and his series of three books, of which the second, *The Single Woman*, has just been published, on the former. For the *Anatomy*, which is a beautifully produced volume, he has not depended entirely on his own experience, but has drawn from many other sources. A number of the drawings are made from his own patients and cross references are given to the case histories published in the other books; the statistical graphs are also based in some instances on figures from his own experience, but added to these is the experience of many observers in many lands. The diagrams of the anatomical relationship of the genitalia during coitus are deductions from a thorough knowledge of the various anatomical types in both sexes, but are nevertheless, as the author admits, guesses, and will remain so until the science of x-ray photography advances sufficiently to allow us to take actual photographs of the male organ *in situ*.

The author is conscious of the incompleteness of his work and is most insistent that it is to be considered only as a foundation on which sex anatomies of the future can be built. However, most readers of his book will be very surprised that so much information is available.

The bulk of the other book is made up of sex histories; this, the author explains, is inevitable where one is dealing with a comparatively new subject, as it is necessary to give the full data on which conclusions are based. With this attitude we agree; this book would certainly lose ninety per cent of its value without these case histories. The comparison of his first fifty with his last fifty patients provides very interesting material for the student of human social custom. The clothes may be different, but the women within them are very much the same; the single woman of to-day gets pregnant a little more frequently, but more single women of 1895 suffered from venereal disease; his later

patients appeared to be more outspoken and honest, but this, the author thinks, may have been due to his increased experience in gaining their confidence. This brings us to perhaps the most remarkable feature of the book—the evidence of the growth of the confidence that the author inspired; at the first visit his patients were often inclined to be reticent, but at their later visits—and they all seemed to come back to him, some for forty years—they confided their innermost thoughts and gave intimate details of their lives, details that they had probably never discussed with their closest friends. (In justice to the author it should be mentioned that this confidence was not betrayed and that the case histories have been denuded of any details that could possibly lead to the identification of the patients, and in some instances alterations in non-relevant medical details have been made to complete the disguise).

These two books will help to lay the foundations of what we hope will develop into a scientific medical literature on the sexual relationship of man and woman. Both books are eminently unsuitable for the non-medical reader and we sincerely hope that they will not find their way into the railway station bookstall. To label them 'for medical men only' would ensure their wide sale amongst the laity, but there must be some other way of discouraging their sale in other than medical bookshops and we hope that the publishers will do what they can in this matter.

If the last quarter of a century has been remarkable for the quantity of its popular sex books, let us hope that the next will be distinguished by the quality of its medical sex literature.

L. E. N.

MEDICINE: ESSENTIALS FOR PRACTITIONERS AND STUDENTS.—By G. E. Beaumont, M.A., D.M. (Oxon.), F.R.C.P., D.P.H. (Lond.). Second Edition. 1934. J. and A. Churchill, Limited, London. Pp. xviii plus 746. Illustrated. Price, 21s.

The first edition of this book was reviewed in these columns just a little over a year ago. We must congratulate the author on this well-deserved success.

Even in eighteen months things happen and a certain number of alterations and additions have been made. Only a few pages have been added to the book, it is gratifying to note, because one of the outstanding features of the first edition was the nice judgment that the author had displayed in his choice of matter for inclusion. With time and the world's literature at his disposal anyone can write an encyclopædia on a subject; to write a concise account requires a profound knowledge.

The two most important alterations are modifications of the names and doses of drugs to conform with the British Pharmacopœia of 1932, and the adoption of a new classification for the anæmias. His choice of Davidson's classification is a wise one; it is certainly better than the division into micro- and macro-cytic anæmia which has no ætiological basis at all.

The sections dealing with tropical diseases are on the whole very satisfactory and up to date. Plasmochin and atabrin are mentioned in the treatment of malaria. It is however disappointing to see that sodium antimony tartrate is the only treatment given for both kala-azar and oriental sore; in the case of the former disease, tropical workers are unanimous in their opinion regarding the superiority of the pentavalent compounds, the most successful of which have now been in use for ten years. In the leprosy section we note that hydriocarpus has acquired a superfluous 'n'.

This book is an ideal one for the student and we strongly recommend it to teachers of medicine in this country. It should also prove a useful reference book for practitioners.

L. E. N.

CLINICAL STUDIES ON THE PHYSIOLOGY OF THE EYE.—By J. Grandson Byrne, M.A., M.D. 1934. H. K. Lewis and Company, Limited, London. Pp. x plus 144, with 49 illustrations. Price, 10s. 6d.

THIS work has been written for the benefit of the physician to help him in the practical application on the human subject of the author's experimental work upon the eye.

As the writer points out, the ultimate aim of the diagnostician is to get as clear an insight as possible into the nature, extent and significance of derangements in the living patient and to interpret these in terms of disordered physiological mechanisms, all of which presupposes an intimate knowledge of the normal ones.

Hitherto the study of pupillary changes and of pain and hyperalgesia incidental to somatic and visceral disease have been little more than of transitory academic interest to the general practitioner. From his experimental work, the author believes he has succeeded in establishing the mechanistic hypothesis for pain, referred pain and tenderness in general, and in his present work he records and discusses some of his experimental and clinical findings.

The book consists of fourteen chapters dealing with the mechanism of pupil reactions under various circumstances, and of which the ones on the mechanism of anisocoria and the Argyll-Robertson phenomenon are perhaps the most instructive and interesting.

The author wisely points out the importance of a thorough training in the theory and practice of general medicine before one can be a skilled specialist in the art of ophthalmology. The prescribing of glasses may seem to be easy, but should not be undertaken in a light-hearted manner in the treatment of disordered ocular functions. Accommodation for both near and far is carried out by neuro-muscular mechanisms, and it should be remembered in disorders of accommodation that treatment should be directed to the restoration of the defective neuro-muscular functions. The underlying cause of the factors should first of all be dealt with and the clinical findings, as arranged by the author under the three headings, physical, mental, and endocrine-vitamin deficiency, furnish the indications for general treatment. The prescribing of glasses should be of secondary consideration, and they should only be prescribed under compulsion after taking into account the handicap which the wearing of glasses when once started may have on the complete restoration of ocular functions. The author considers that in these modern times far too many individuals of all ages are wearing glasses. Many of these people really only require glasses temporarily for the relief of eye strain, which later become contra-indicated as they tend to retard restoration of function in the affected ocular mechanisms.

The book is a most excellent one, written in clear, simple language, and well illustrated, and the author is to be congratulated for having made such a valuable contribution to the literature of British ophthalmology. We cordially recommend it and it will be found a most valuable, not only to the ophthalmologist but to the general physician, help in the early diagnosis of disease.

E. O'G. K.

ORTHOPÆDICS IN CHILDHOOD.—By W. L. Sneed, M.D. 1932. J. B. Lippincott Company, Philadelphia and London. Pp. xviii plus 318, with 145 illustrations. Obtainable from Messrs. Butterworth and Company (India), Ltd., Calcutta. Price, Rs. 15-12

THIS is a volume of the everyday practice series—a series of books meant to give recent information on the subjects they deal with. In this volume the whole subject of surgical diseases of childhood is dealt with. The manner is generally superficial and is apparently meant to mark out a line of treatment after the diagnosis is made by the general practitioner and to

point out the indication for expert opinion and treatment. The clinical side of the diseases has been briefly touched upon—apparently intentionally—while several methods of operative procedure, which are of doubtful value, find place in it. There are two useful chapters on physio-therapy and surgical appliances which should prove valuable to the practitioner. Short anatomical descriptions of the regions dealt with should prove useful to the busy practitioner for whom the book is intended, but some of these need revision and correction—with revision the book should improve considerably and should be of great help to those for whom it is intended. The printing, the general scheme and the illustrations are excellent.

L. M. B.

MINOR SURGERY OF THE URINARY TRACT.—By H. C. Bumpus, Jr., Ph.B., M.D., M.S. (in Urology), F.A.C.S. 1932. W. B. Saunders Company, Philadelphia and London. Pp. 124, with 57 illustrations. Price, 15s.

THIS compact volume is one of the Mayo Clinic monographs. It describes the treatment of the more common and important diseases of the urinary tract by modern methods—several of the methods of treatment described, such as that of transurethral partial removal of the prostate by special instruments, can hardly be called minor surgery. To the patient such procedures will appeal as there apparently he is not subjected to a cutting operation as it is commonly understood. By the use of a cleverly designed urethrocystoscopic instrument, partial removal of the prostate by cutting into it, or partially destroying it by fulguration, destroying bladder tumours by the latter method and electro-coagulation, and removal of ureteral stones have opened out a field for this branch of surgery which promises a great future for it. The author lays down his instructions very carefully and briefly and his descriptions have the weight of experience and dexterity behind them. The methods are highly specialized and require a considerable amount of training and experience to prove successful at the hands of the practitioner. The book is attractively printed and the illustrations are excellent.

L. M. B.

BENIGN TUMOURS IN THE THIRD VENTRICLE OF THE BRAIN: DIAGNOSIS AND TREATMENT.—By W. E. Dandy, M.D. Balilière, Tindall and Cox, London. Pp. 171, with 120 figures. Price, 22s. 6d.

UNTIL a few years ago the case of cerebral tumour usually remained in the hands of the physician; that is to say, it was thought better to do little and pray for a miracle than to hasten the end by surgical interference. There were of course exceptions, but tumours of the third ventricle were not included amongst these. Times have now changed and the advent of the ventriculogram and the electro-cautery have made procedures possible that were hitherto undreamt of.

That benign tumours of the third ventricle are not exceedingly rare surgical curiosities is shown by the fact that the experience of one surgeon has included twenty-one cases, and that it has been possible to collect forty-seven other cases of this condition from the literature; the latter were all diagnosed in the post-mortem room.

The diagnosis and treatment of these twenty-one cases is described in detail, with the aid of some most excellent diagrams, ventriculograms, photographs and photomicrographs that make every stage in the procedure perfectly clear. Exact localization is first effected by means of ventriculography, that is to say by tapping a lateral ventricle and replacing the fluid by air, and then taking roentgenograms of the head; the tumour can sometimes be seen, but as a rule the diagnosis is made on the visualization of the air-filled ventricles.

The author, who is a professor of surgery at the Johns Hopkins University, is to be congratulated, not only on the marvels of surgery that he has wrought but on the writing of a book that is a model of concise description of intricate procedure, and the publishers on a most beautiful example of book production.

NEURO-ANATOMY: A GUIDE FOR THE STUDY OF THE FORM AND INTERNAL STRUCTURE OF THE BRAIN AND SPINAL CORD.—By J. H. Globus, B.S., M.D. Sixth Edition. 1934. Baillière, Tindall and Cox, London. Pp. xv plus 240, with 89 illustrations. Price, 16s.

NEURO-ANATOMY is very definitely a 'special' subject. The textbooks of anatomy and physiology give one some information on it but not sufficient for specialists, or even for the embryo specialists, in psychology, neurology, or nerve and brain surgery.

The subject lends itself very well to the 'atlas' form of treatment, and the book under review is a sixth edition of a neurological atlas that has already made for itself a considerable reputation in America as well as in other countries. One of the features of this atlas is that the diagrams are not heavily labelled; in fact some of them are not labelled at all, so that the student can identify the various structures for himself; this will help him to visualize and memorize them better than if he were 'spoon-fed'. Needless to say the text provides the clue to the identities of these structures so that there can be no danger of misunderstanding arising, if the text is followed intelligently.

The idea of self-instruction is further developed by the inclusion of 53 plates that are 'blanks' of different portions of the central nervous system. The pages are perforated so that the student can tear out each plate, label the different structures, fill in details, and then replace them in the book.

It is a book that should prove very valuable to students, more especially those preparing for one of the higher examinations.

PRACTICAL X-RAY THERAPY.—By H. Davies, M.A. (Oxon.), M.R.C.S. (Eng.), D.M.R.E. (Camb.). J. and A. Churchill, London. Pp. viii plus 134, with 47 illustrations. Price, 8s. 6d.

THIS little book sets forth in a lucid and interesting manner the elementary facts in connection with x-ray therapy.

The preliminary chapters deal with points in connection with apparatus, measurement of x-ray dosage and care of the patient. These are followed by short chapters on the treatment of various diseases which are amenable to this form of therapy, and finally there is an appendix giving a series of depth-dosage tables.

The author does not pretend to deal exhaustively with his subject, but merely to give an outline of the methods used, the aim and scope of x-ray therapy.

The book is thoroughly up to date and, while it can be recommended to the notice of the student and practitioner, it will also be read with interest by the expert.

J. A. S.

THE DERMATOGESSES OR OCCUPATIONAL AFFECTIONS OF THE SKIN.—By Robert Prosser White, M.D., M.B., C.M. (Ed.), M.R.C.S. (Lond.). Fourth Edition. 1934. H. K. Lewis and Company, Limited, London. Pp. xvi plus 716, with 72 illustrations on 66 plates. Price, 35s.

It is sad to have to record that the author died only a few days after going through the final proofs of the fourth edition of this standard work.

This book, which deals with a very difficult and vexed subject, is increasingly in demand with the development of modern industry. It is a mine of information, a veritable encyclopædia on the subject,

and will we feel sure greatly benefit dermatologists, insurance companies and the various industries. The present edition includes a considerable amount of new material, keeping it abreast with the modern developments in industry. There are very few industries which the author has left untouched. The masterly way in which he has dealt with the various physical and chemical agents used in different industries, the chances of getting affected by these agents, and the way these act on the human skin, demonstrate the author's untiring energy, his wide experience and his vast knowledge on the subject. The exhaustive references on every page and an index comprising more than a third of the book will be extremely useful to workers in this field. This has been rendered possible through the efforts of Miss Anne Newbold who is intimately acquainted with the current dermatological literature.

In a treatise like this there are bound to be some points where it is possible to differ from the author's opinion, e.g., we do not agree that industrial irritants cannot give rise to permanent hypersensitiveness—an 'allergic condition'—in a healthy individual. A normal person in our opinion may become permanently hypersensitive to a particular industrial irritant, or 'allergen', to which he was not sensitive previously, and he may continue to remain so for a considerable period of time after the irritant has been removed, sometimes throughout his life; and further he will not only react to that particular irritant, but also to other allied substances.

A simpler style and less use of dermatological terminology would have been better appreciated, but the excellent photographs and admirable coloured plates have amply compensated these minor defects.

L. M. G.

THE COMMON DISEASES OF THE SKIN: A HANDBOOK FOR STUDENTS AND MEDICAL PRACTITIONERS.—By R. Cranston Low, M.D., F.R.C.P. Second Edition. 1934. Oliver and Boyd, Edinburgh. Pp. xiv plus 317, with 150 illustrations—eight of which are in colour. Price, 12s. 6d.

THE introductory sections on the anatomy, physiology and pathology of the skin, on the diagnosis of skin diseases, and on the general principles of their treatment are all very clear and concise, and should prove useful to the student. The different skin conditions with their picturesque but not very useful names are then discussed one by one; these are arranged in groups, some with reasonable classifications, such as, Diseases of Animal Parasites, and Fungus Infections, others with unreasonable ones, such as Scaly Eruptions and Dermatitis and Allied Conditions. These, however, are according to the usual tradition in books on skin diseases and we direct no special criticism at the author on this account. Only the common diseases are dealt with and every attempt has been made to avoid confusing the student by even referring to the rarer skin conditions, a very satisfactory feature for a book of this scope.

The illustrations, many of which are in colour, are of a high quality and should prove useful diagnostic aids. The book is of very suitable size for the student to carry and is altogether eminently suited to his requirements. We can also recommend it to the practitioner.

LYOPHILIC COLLOIDS: THEIR THEORY AND PRACTICE.—By M. H. Fischer and M. O. Hooker. 1933. Baillière, Tindall and Cox, London. Pp. viii plus 246, with 84 illustrations. Price, 22s. 6d.

THE senior author of this book is already a household name among students of colloid chemistry. His attempts however at the application of this branch of the subject to such medical problems as oedema and acidosis are less well known outside of the U. S. A. The book is divided into three parts. Part I deals with the general nature of lyophilic colloids. The

essential difference between lyophilic and lyophobic colloids is clearly explained. The latter, the simpler and better known, may be looked upon as solid particles (disperse phase) in a fine state of subdivision suspended in a fluid medium (continuous phase), e.g., colloidal silver or gold in water. The former consists of particles of a strong solution of, for example, soap in water (disperse phase) suspended in a weak solution of the soap in water (continuous phase). The distinctive feature of this type is that under certain conditions such as lowering of the temperature or withdrawal of water the phases may be reversed and a gel formed. Once this occurs the continuous phase is now the original disperse phase and the new disperse phase consists of droplets of a weak solution of soap in water. At the extreme gel formation these droplets may be completely absorbed by the solid continuous phase. Part II discusses the more or less commercial chemical applications such as the livering of paints and the composition of cosmetics, etc. Part III discusses the biological applications. The authors in part I have shown that the imbibition of water by such lyophilic colloids is conditioned by the presence of acids, alkalis and neutral salts. It is suggested, for instance, that in a condition of acidosis the proteins of the cell combine with the acids, imbibe more water and thereby bring about a condition of oedema. It is further pointed out that as the proteins combine with the acids there may be scarcely any change in the pH of the tissues. The suggestion is interesting in view of the fact that there is still a body of opinion that considers that there is some extra-renal factor in oedema secondary to nephritis, apart from salt retention and cardiac failure. The enthusiastic medical with physico-chemical leanings would do well to remember however that the total water balance of the body is controlled to a certain extent by other factors such as pituitrin and the new extract from the cortex suprarenalis which appears to influence the mobilization of sodium from the tissues to the blood. It is to be regretted that the author has not taken up the physical chemistry of the blood proteins, where the conditions would be less complicated than *in vivo*. The book however should prove suggestive to the serologist. It is clearly written, contains no mathematical formula, and should be comprehensible to anyone with quite an elementary knowledge of chemistry.

H. E. C. W.

A NEW APPROACH TO DIETETIC THERAPY.—By E. Földes, M.D. 1933. Richard G. Badger, Boston. Pp. xii plus 434. Price, \$5.00

This book is particularly well named, as nearly two-thirds of it is devoted to the 'approach', that is to say, to the development of the argument on which the author's theory of dietetic treatment is based. His argument is shortly this: all the functions of the body are governed by simple physico-chemical laws, they are all interdependent on one another, and they can all be influenced, directly or indirectly, by adjustment of the mineral and water retention and elimination. This adjustment can be effected almost entirely by suitable dietary. The diseases in which mineral and water retention plays an important part are discussed, the author's anti-retentional diet is described and explained, and finally a number of cases are quoted in detail in support of the theory.

To discuss effectively the merits and demerits of Dr. Földes' theories it would be necessary to write a book of length equal to the one under review, as this consists of page after page of close argument, each conclusion leading to the next. It cannot be denied that most of the physiological and pathological functions of the body are dependent on physico-chemical laws, but it seems extremely doubtful if they can be explained on the simple physico-chemical laws of osmosis, diffusion and membrane equilibrium as we know them to-day, and in many cases the author's arguments are involved and unconvincing.

It is always a good thing to approach a subject from a fresh angle and Dr. Földes has certainly done this. The dietitian and the biochemist will find the book stimulating. We can also recommend it to the practitioner who always likes to take a view different from that of the majority.

LABORATORY MEDICINE: A GUIDE FOR STUDENTS AND PRACTITIONERS.—By D. Nicholson, M.D., M.R.C.P. (Lond.). Second Edition. Thoroughly revised. 1934. Henry Kimpton, London. Pp. xv plus 566. Illustrated with 124 engravings and 3 coloured plates. Price, 30s.

It is less than four years ago that we had the pleasure of reviewing the first edition of this book. We gave it as our opinion that it would prove useful to the medical profession and it is gratifying to see this opinion vindicated by an early demand for a second edition. We made two minor criticisms, and in the second edition both the defects that called forth these criticisms have been rectified.

A number of additions have been made and a few sections have been brought up to date, especially those on hypogranulocytosis, aplastic anæmias, the classification of anæmias, blood grouping and transfusion, blood calcium and phosphorus, water metabolism, the serum diagnosis of syphilis, immunity tests and immunization in diphtheria and scarlet fever, convalescent serum in poliomyelitis, measles, mumps and whooping cough.

These additions have enhanced the value of this book without adding seriously to the bulk and we can whole-heartedly endorse our previous opinion that it is a book which will be of very great value to the student and practitioner.

L. E. N.

BLOOD DISEASES IN GENERAL PRACTICE.—By A. Pinney, M.D., M.R.C.P. 1934. (Pocket Monographs on Practical Medicine.) John Bale, Sons and Danielsson, Ltd., London. Pp. 92. Price, 2s. 6d.

This pocket monograph series of books on practical medicine has proved a great success, and we must congratulate the publishers on their enterprise. However, it cannot have entailed any great mental strain on their part to think of the name 'Pinney' when the question of a book on blood diseases arose; they are fortunate in having been able to negotiate the next step successfully.

It is quite impossible to dismiss the subject of blood diseases in twenty-five thousand words and the author has necessarily had to skate rapidly over the surface. The information he has given is up to date and will be found valuable by the practitioner. The question of ætiology is not gone into to any great extent. Suggestions for treatment are made, but they are seldom explicit; some readers will be disappointed by this. No attempt at classification of the anæmias has been made; it was probably thought that this would be out of place in a book written mainly for the practising doctor, but we cannot help feeling that the only way that a proper grasp of the ætiology, and therefore indirectly of the treatment, of the anæmias can be obtained is by classifying them. This is by no means the best example of the books of this series, but nevertheless practitioners will find it very useful indeed.

L. E. N.

A TEXTBOOK OF PHYSIOLOGY FOR MEDICAL STUDENTS AND PHYSICIANS.—By W. H. Howell, Ph.D., M.D., Sc.D., LL.D. Twelfth Edition. 1933. W. B. Saunders Company, Philadelphia and London. Pp. 1132, with 308 illustrations. Price, 32s. 6d.

HOWELL'S is one of the best known of the American textbooks on physiology. It was first published about thirty years ago, and it has gone through twelve editions and an equal number of reprintings during

this period. The subject is such a vast one that it is difficult to keep a textbook within reasonable dimensions; the temptation to add to the chapters rather than to revise and rewrite them must be considerable. During the period of three years since the last edition advances have not been made in every branch of the subject so that it has only been necessary to revise certain sections, e.g., those on the vitamins, on the hormones, and on the chemistry of muscle contraction, but these sections have been recast and not simply patched. In a subject like this it is very difficult to pick out significant advances in our knowledge for inclusion, knowing as one does that even these now significant advances have not carried us to finality, but are simply steps which will in their turn be forgotten. The author seems to have achieved this very successfully, and to have written a well-balanced book.

The book is of a useful size, the print is clear and not too small, and there are a number of well-chosen diagrams and other illustrations. It is altogether a very satisfactory book for the student.

THE NEW-BORN BABY. A MANUAL FOR THE USE OF MIDWIVES AND MATERNITY NURSES.—

By E. Pritchard, M.A., M.D. (Oxon.), F.R.C.P. (Lond.). 1934. Henry Kimpton, London. Pp. xl plus 272, with 9 illustrations. Price, 4s. 6d.

INFANT-WELFARE work in India suffers much from the lack of liaison between the teaching given to health visitors and to midwives on the care of the new-born baby. Insufficient attention is paid to the preparation of the midwife for this aspect of her duties during the lying-in period, and the little book *The New-Born Baby* from the authoritative pen of Dr. Eric Pritchard is a valuable guide to the scope and nature of the knowledge which the pupil midwife and the medical student alike should acquire during their term of service in the maternity wards.

The book is easy to read and since it is full of personal preferences, with reasons annexed, it is never dull. The chapters on the value of correct education of the respiratory, circulatory and digestive systems and on the training of the heat-regulating mechanism are specially useful and some interesting suggestions are made on the relationships between vitamin deficiencies and the occurrence of 'pink disease' and hæmorrhages in the new-born.

The book is written to fill a gap which has been viewed by the author from both sides, that is, in his double capacity of consultant to a midwifery training hospital and to a welfare clinic, and if widely used, as it deserves to be, it will do much to help the midwife and health visitor to give the correct advice to the lying-in and nursing mother, respectively: the advice now given is seldom uniform and often conflicting. Its use will also hasten the day when the full usefulness of the maternity and child-welfare services will be experienced.

J. M. O.

MIDWIFERY FOR NURSES.—By R. Andrews, M.D., B.S. (Lond.), F.R.C.P. (Lond.), F.C.O.G., and Victor Lack, M.B., B.S. (Lond.), M.R.C.P., F.R.C.S. (Edn.), M.C.O.G. Seventh Edition. 1934. Edward Arnold and Company, London. Pp. viii plus 268. Illustrated. Price, 6s.

THIS book contains the essentials of midwifery for nurses expressed in a particularly clear and concise manner without irrelevant details and with a minimum of scientific terms. It should be of great value as a short textbook for midwives.

The emphasis throughout is on the normal and practical side of the subject. The chapters on puerperal sepsis and eclampsia are rather poor in detail from the point of view of practice in India, and the chapter on contracted pelvis is written entirely from the point of view of practice amongst Europeans. But with these

modifications in mind, the book might well form a basis for teaching purposes in India, for the fundamental principles are insisted upon and particularly clearly and simply expressed.

M. I. N.

MOTHERHOOD *: A GUIDE FOR MOTHERS. Fourth Edition. 1934. Published by Messrs. Cow and Gate Limited, Gullford, England. Pp. 246. Illustrated. Price, 1s.

MESSRS. COW AND GATE have issued a fourth edition of their small book *Motherhood*. It is attractively produced and interestingly written and a thoroughly reliable guide to mothers in the care of their own health and that of their babies. The methods of production and the advantages of 'Cow and Gate' milk are naturally given prominence in the chapters on artificial feeding and an appendix gives an account of the uses of various other 'Cow and Gate' products, but the book in addition contains a fund of sound advice on the general management of babies and the treatment of minor ailments.

A MEDICAL SURVEY OF ADEN, 1933.—By Lieut.-Colonel E. S. Phipson, D.S.O., M.D. (Lond.), M.R.C.P. (Lond.), D.P.H., D.T.M. & H., I.M.S. 1934. Cowasjee Dinshaw and Brothers' Press, Aden. Pp. 90, with 9 plates

IN the minds of those of us whose homes are in Europe and whose work is in India, Aden occupies a significant place. When we leave our own countries for the 'glamorous' east, we may think that Port Said, with its Selfridge-like store on the front and its entertainments so obviously arranged for the tourist, is a bit of a fraud, but Aden, with its heat, its dust, its smells and its camels, is, we feel sure, the real thing. And likewise when we retire after many years of toil, Aden again looms very large; it is where we give rupees and receive change in annas for the last time, and if we are theatrically disposed it is where we throw our topes overboard as the ship sails out of the harbour. To the writer, who long since made his first voyage and will, he hopes, not make his final one for some years, Aden still has a significance, as it is where the port health officer, the civil administrative medical officer, and the medical officer in charge of the European civil hospital, in the person of one extremely cheerful individual, always comes (or come) on board. One speculates for the rest of the voyage on how, in this very trying climate with such exacting duties, he manages to maintain this cheerfulness. Perhaps it is the multifariousness of his duties which prevent him from brooding over the heat. One of his recreations appears to be authorship and Colonel Phipson has written a most readable and interesting account of the medical administration of Aden, with particular reference to the last ten years, during which time he has served there continuously.

We will not discuss this book in detail here, as we have made an abstract from it which will be found in a subsequent number of the *Indian Medical Gazette*.

We recommend our readers to obtain a copy of this book, which we hope is on sale in Aden, when next they arrive at that port. It will add considerably to their possibly-flagging interest in this isolated spot on the edge of the Arabian desert.

[*We have been informed by Messrs. Cow and Gate that the book can be obtained for Re. 1 (post free) to any destination in India from their Agents in India who are Messrs. Carr and Company, Limited, Ballard Estate, Bombay, from their Agents in Burma who are Messrs. E. Solomon and Sons, 460, Dalhousie Street, Rangoon, and from their Ceylon Agents who are Messrs. Miller and Company Limited, Colombo.—Editor, I. M. G.]

Abstracts from Reports

LEAGUE OF NATIONS HEALTH ORGANIZATION, EASTERN BUREAU. ANNUAL REPORT FOR 1933 AND SUMMARY OF PROCEEDINGS OF THE EIGHTH SESSION OF THE ADVISORY COUNCIL HELD AT SINGAPORE, 5TH AND 9TH FEBRUARY, 1934

DIRECTOR'S REPORT ON THE WORK OF THE EASTERN BUREAU FOR THE YEAR 1933

Advisory Council

THE Advisory Council met at the offices of the Bureau, Singapore, on 29th March, and continued its deliberations until Saturday, the 1st April. A short summary of the proceedings, together with the resolutions, was printed with the report for 1932. The Council, on the last day of the session, appointed Dr. Hermant, Inspector-General of Medical and Health Services, Indo-China, as Chairman for the ensuing year and Dr. Wu Lien-teh, Director of the National Quarantine Service of China, Vice-Chairman. The meeting of the Council was attended by delegates from each country represented upon it, with the exception of British India. The Council was pleased to have the assistance, in addition, of delegates from Hong Kong, Philippine Islands and Straits Settlements.

In December, Lieutenant-Colonel Russell assumed office as Public Health Commissioner with the Government of India in succession to Major-General Graham. The latter was the first Chairman of the Advisory Council and retained this position for the first four years of the Council's existence. His absence from future Council meetings will be much regretted by the other members and by the officials of the Bureau, who have received unflinching support from him throughout his connection with its work. It is understood that Colonel Russell will in future represent British India on the Council.

In view of the fact that less than twelve months would have elapsed if the meeting of the Council for 1934 were held at the ordinary time, early in February, it has been decided not to convene a full meeting of the Council in the early part of 1934. It is hoped, however, that the Chairman and Vice-Chairman will be able to consult with the Director in regard to the programme for 1934 and that an opportunity may present itself during the meeting of the Far Eastern Association of Tropical Medicine, later in the year, for Members of the Council to hold at least an informal discussion regarding the working of the Bureau. It will be remembered that, when the constitution of the Advisory Council was under consideration, a suggestion was approved that at intervals a meeting of representatives of all health authorities in the Eastern zone should be held, in addition to meetings of the Advisory Council. Although this question has been previously raised at meetings of the Advisory Council it has so far not been carried into effect. It is, however, under consideration as to whether it may be possible to organize such a meeting during 1935. If this could be done, the opportunity would present itself for a discussion on rural hygiene in the Far East, in regard to which a considerable amount of information has already been forwarded by various countries to the Bureau.

Fourteenth Assembly

The report of the Health Organization, which was submitted during the Fourteenth Assembly at Geneva, contains a reference to the extension of the National Quarantine Service of China, by reason of which the Eastern Bureau was able to obtain more rapid information regarding the epidemiological situation of the

ports under Chinese control. It also referred to the decision of the Advisory Council in favour of creating at Singapore, under the auspices of the Health Organization and in collaboration with the Government of Straits Settlements, an international course of malariology, the theoretical and laboratory work of which would be carried out at the Medical College at Singapore.

Epidemiological intelligence

This service continues to be the main purpose of the Bureau's existence. Since 1925, when the Bureau first commenced to function, efforts have been directed towards the improvement of this service, and these efforts have met with such success that the only real shortcomings at the present time are a lack of cabled information in regard to the situation in Vladivostok and incomplete knowledge of the exact situation in certain inland provinces of China and in British Indian States.

Correspondence has taken place with the authorities in French India with regard to the possibilities of expediting weekly returns, which at present are received somewhat late. Arrangements have been come to by which cabled information, and also information sent by post, will be despatched at such time as will enable the Bureau to receive it at the same time as it reaches the Minister for the Colonies in Paris.

Disease incidence—Plague in ports

Compared with the previous five years the incidence of plague in Eastern ports has been relatively slight. This applies more particularly to ports in the Near East, such as Alexandria, Port Said, Suez and to Tamatave. It also applies to Rangoon and, to a lesser extent, to Colombo.

Rodent plague

The degree to which attention was paid to examination of rodents for plague infection varied in different ports. The returns showed that 4,000 or more rodents were examined each week in Bombay, and it was rarely that all rodents were found to be free from infection. The extent of the rodent infection varied definitely with the season, a noticeable increase in the number found in Bombay being seen during the latter half of February and throughout March and April. From the end of April onwards the number found infected remained much smaller. Plague-infected rodents have been detected in Bassein, where the greatest number was found in April and May, but where odd infected rats were discovered throughout other portions of the year. In Rangoon, however, where plague-infected rodents have been found during the year, the most noticeable feature has been the absence of infection amongst those examined from the middle of February until the end of June, although the number examined remained steady during that period. Colombo has found at intervals infection amongst the rodents, but here, as in Rangoon, none was detected during the months of March, April, May and June.

General

The returns from ports show that plague infection is confined to a few only, but that these are endemically infected, with seasonal exacerbations in certain cases. The danger of transfer from these ports varies however. Bombay has a large export trade in raw cotton which has been shown to be a suitable medium for transfer of plague infection, while the main export from Rangoon and Bassein consists of rice. This again is incriminated as a medium suitable for plague transfer. Ceylon, on the other hand, exports tea, rubber, coconuts, etc., products which are not regarded as being in the category of rat-attracting cargo. Bangkok being the centre for the export of rice from Siam, and Saigon for Indo-China, are both potentially dangerous, as is also Phnom-penh. There is, however, a marked difference in the volume of merchandise exported from these

ports. For example, Bassein, though situated in the delta region of the Irrawaddy, and being a collecting centre for rice, is only a minor port compared with Rangoon, through which over 80 per cent of the trade of Burma passes. Pnom-penh is accessible to ocean-going vessels, and, although of much less commercial importance than Saigon, it has a large trade with the latter port and may be a source of plague infection of even more importance. It is a noticeable fact that the principal port in British India from which raw cotton is imported, as well as the principal ports of the chief rice-exporting countries of the East, namely, Burma, Siam and Indo-China, are the plague centres of the East.

Plague in countries—British India

The mortality curve for 1933 differs from that constructed from the mean mortality figures for the preceding five-year period. The latter curve shows an increase in prevalence through January and February, to reach an apex in March, which is maintained until April, after which it falls quickly and the minimum level occurs during June. This is followed by a gradual but definite rise throughout July, August, September and October, and from then on to the end of the year. In 1933, however, the mortality remained at an almost constant level throughout January, February and March, and at a much lower level than the mean of the preceding five years. The tendency to fall throughout April and May was present and the lowest level was reached in June. From this time onwards, however, the mortality figures have risen more sharply than in the previous five years and the mortality has been much higher.

The provinces in which plague occurs are mainly three, Bombay, United Provinces and Punjab. The alteration in the mortality curve is explained by a comparison of the seasonal prevalence for the year in these, and, to a lesser extent, in certain other provinces with that of the mean for the preceding five years.

The maximum seasonal prevalence in United Provinces occurs in March, that of Punjab in April and of Bombay in October, while Central Provinces and Bihar and Orissa also have their highest mortality in February and March. In 1933, however, the mortality in the United Provinces was much below the average, reaching a maximum figure of 150 deaths only in the week of heaviest mortality as compared with the mean maximum of 1,850 deaths in one week for the preceding five years. The plague situation at this period of the year in this province was thus the principal factor in determining the shape of the curve for British India as a whole for the corresponding period.

Indian States.—The returns from the Indian States are incomplete, but the States of Hyderabad and Mysore and the Indian States in Bombay Presidency have shown a considerable mortality. In the group of Indian States and agencies, which includes the Indian States in Bombay Presidency, there was a heavy mortality in January, February and March, followed by a minimum mortality in April and May. This was followed by a marked rise to maximum figures at the end of August. Again, towards the end of October, a very high mortality was recorded which was due probably to the influence of the Bombay States, which have recorded a higher mortality in 1933 than in any of the preceding five years.

Cholera in ports—British India

Consideration of cholera in Eastern ports in 1933 resolves itself mainly into a chronicle of events in Calcutta, which, as usual, has been infected throughout the year. The disease has followed the usual course fairly closely and consequently has shown a marked tendency to increase in prevalence in the latter half of March, which tendency is continued sharply throughout the month of April in the last week of which the peak was reached. During May and June a marked fall in the number of cases occurred, and,

from the middle of June onwards, the disease has continued, but in endemic form. Compared with the curve showing the mean for the previous five years, 1933 has shown a higher peak which was reached about two weeks earlier than that for the quinquennial mean. This increased incidence has been quite considerable being approximately 25 per cent above the average for the previous five years.

Among other ports of British India, *Chittagong* has shown a much heavier incidence than in 1932, but this year's record, however, compares very favourably with 1931. The greater proportion of the cases in 1933 occurred in April and May, although sporadic cases were reported at intervals throughout the year.

Madras, which, during the five years preceding the one under review, was heavily infected in 1928 and in 1931, was entirely free from the disease from March 1932 until the last week of October 1933. After this, and until the end of November, sporadic cases were reported, but at the beginning of December the disease appeared in epidemic form, but quickly abated, the epidemic prevalence disappearing by the middle of December.

The other ports of British India from which cases were reported include *Bombay*, *Moulmein* and *Rangoon*, in each of which sporadic cases only were recorded. The same condition of affairs prevailed at *Vizagapatam*, where the cases were practically confined to the weeks ending 29th July to 12th August.

Cholera in countries—British India

Cholera has been very light in British India as a whole during 1933. Compared with the mortality for the preceding five years the disease this year has caused deaths which are only approximately one-tenth the mean figure of the preceding quinquennial period. Russell has drawn attention to the tendency of cholera in India to follow a six-year cycle, but points out that adherence to this cycle is not necessarily constant, nor does this tendency explain the problems associated with the epidemiology of the disease.

In many of the provinces—e.g., Bihar and Orissa, United Provinces, Central Provinces,—the year 1930 showed the highest mortality for the quinquennial period 1928—1932. The year 1930 was also the year of maximum mortality in Bihar and Orissa, United Provinces and Central Provinces for the six-year period 1925—1930, whereas Bengal and Madras Presidency reached their peak in 1928, and Bombay and Punjab in 1927. It is probable that 1933 was at the bottom of the cholera cycle but the number of deaths has fallen so very rapidly since 1930 as to suggest that several favourable factors were at work.

The position, compared with 1932, is that cholera mortality showed over the whole year a definite rise in Central Provinces and Bombay Presidency and a definite decrease in Bengal and Madras Presidencies as well as a slight decrease in Assam and in Bihar and Orissa.

The graph shows that there was the usual tendency towards an increase of mortality in March, but the mortality, instead of continuing to rise sharply in April, remained steady for the first three weeks and then decreased to a minimum in June. This was followed by a steady rise throughout August, September, and the early part of October, before the fall commenced later in that month. The explanation of this variation in the graph from that of the quinquennial mean is seen when those for individual provinces are studied.

Burma

The situation in Burma in regard to cholera in 1933 has been extremely favourable when compared with the mean mortality of the preceding quinquennial period. The picture for that period is of steady mortality throughout the year with a maximum in April. During the last quarter of 1932, however, the mortality was practically non-existent, and this happy state of affairs was continued throughout January and

February of 1933. Throughout April, May and June there was some increase, with maximum figures in July which were much below the average. From August onwards only sporadic cases have occurred.

Smallpox in ports

The early part of 1932 was particularly notable for the epidemic prevalence of smallpox throughout Eastern ports.

Between Alexandria in the Near East and Hong Kong in the Far East many ports recorded a greatly increased prevalence of the disease as compared with the records of the preceding five years. In *Alexandria* the epidemic which commenced in December 1932 increased steadily in January, to reach a peak in the early part of February 1933. The epidemic prevalence fell sharply throughout the remainder of February and through March, and was completely finished in April.

General

A noticeable feature of the returns is the almost complete absence of cases from certain ports of British India, e.g., Chittagong, Moulnicin and Tuticorin. The records of the previous five years show that cases are rarely recorded in *Chittagong*, but *Moulnicin* had in 1928, 1929 and 1930 small epidemics, while *Tuticorin* was visited similarly in 1932.

Smallpox in countries—British India

The year 1933 has been an unfavourable smallpox year in British India, and this fact was seen very early in the year when the high incidence which had developed in the last quarter of 1932 was continued. The peak was reached in April, being a little later than had been the average for the preceding five years. The normal sharp decrease in numbers took place in May and June, with the onset of the south-west monsoon, and this has continued through the succeeding months until October, when an increase commenced.

The mortality in most of the provinces has been higher in 1933 than 1932, and particularly has this been the case in Delhi, Bengal, Bombay and Bihar and Orissa.

Research programme—Plague

Dr. Hirst's contributions to the study of plague epidemiology have been further added to during the year by the publication of the results of 'A Rat-Flea Survey of Ceylon' which contains also 'A Brief Discussion of Recent Work on Rat-Flea Species Distribution in relation to the Spread of Bubonic Plague in the East Indies'. The author expresses the view that the conclusion reached by King and Pandit that 'the flea species factor is of the first importance in the spread of plague' in South India applies equally well to Ceylon.

China.—The rat-flea survey at Shanghai has been continued throughout the year. Of the two prevailing species of rats, *R. rattus* and *Rattus norvegicus*, the former was many times more numerous than the latter throughout the period. The highest flea index was recorded in the month of May, but relatively high figures were also recorded in October, April and December. *Leptopsylla musculi* was the prevailing species, but the presence of *Ceratophyllus anisus* was also determined regularly, with a maximum index in April and May. *X. cheopis* was absent during March, April and June and only a few of the species were found in January, February and May. The index, however, which was 0.01 in May and 0.00 in June was 0.1 in July, 0.75 in August, 0.3 in September and 0.59 in October. The rise in August was more noticeable in that *X. cheopis* was practically the only flea species present during the month. During July and August the mean temperature was 83.7°F. with a mean relative humidity of 82.3 in July and 79 in August. The rainfall was just over two inches in July, but in August was 5.4 inches.

Cholera

Asheshov, in his report for 1932-33 on the Bacteriophage Enquiry, states that he has 'chosen the problems to be studied in such a way that the results obtained might directly help the practical application of bacteriophage'. Some of these problems deal with the results of cultivation on vegetable and synthetic media, the influence of hyperaerobic conditions on virulence, the preparation of pure cholera phage antigens free from vibrio substance, the degree of absorption of cholera phage, the influence of carbohydrates and the development of cholera phage, and the continuation of the search for cholera phage races which are at the same time virulent against the common intestinal bacteria.

Bacteriophage

The biological nature of bacteriophages has been the subject of discussion by Burnet and others. The former concludes: (1) that bacteriophages are independent micro-organisms, viruses which are obligate parasites or symbionts of bacteria, and (2) that there are many different types of bacteriophage which may differ widely in particle size, as well as in almost every activity by which a phage can be characterized.

Andrews and Elford, using filtration methods, have calculated the physical measurements of bacteriophages and find the diameter of the smallest one yet examined identical with that found by the same methods for virus of foot and mouth disease. The size of any one bacteriophage has been found to be remarkably constant and uniform, independently of the nature of the bacterial organism which it attacks, and it is unchanged by purification (Report of Medical Research Council, 1931-32).

Shanghai.—Investigations carried out during the year in Shanghai indicated that practically all samples of 'non-waterworks' water examined, i.e., water from rivers, creeks, ponds and wells, contained non-agglutinating water vibrios. Experimental work is being carried out to determine what happens when true cholera vibrios, water vibrios and mixtures of both are added to water of various kinds. Water vibrios are being grouped according to the scheme established by Finkelstein, and interest is naturally centred on the degree of relationship, if any, which exists between the different groups of vibrios.

Bacteriophage.—Evidence of cholera phage was found in two river and four creek samples examined.

Carriers.—No carriers were found among over 500 specimens of stools examined from hospital inpatients.

Meteorology.—A great deal of meteorological data has been obtained, and from an analysis of this it is possible to show that, in the last seven years, high absolute humidity favours cholera epidemics, but is not always followed by them. Charts from a number of ports showed that cholera only became epidemic when the absolute humidity was above 0.4 in. (cf. Rogers). Deficient winter and/or spring rainfall is apt to be followed by an outbreak of cholera, whereas heavy rainfall appears to have the opposite effect. As the spring of 1933 had a high rainfall, the conditions seemed favourable for a light cholera year, which was actually the case.

Cyclical tendency.—A study of cholera epidemics in Shanghai has also suggested an indefinite four-yearly epidemic cycle.

Calcutta.—Linton's further work in Calcutta tends to establish a closer relationship between water vibrios and true cholera vibrios. Previously it had been thought that water vibrios were distinguishable by having an arabinose-containing carbohydrate, while pathogenic forms had a galactose-containing substance. This is not now found to be a distinction in that two strains from clinical cases of cholera have been found to be arabinose-containing.

Pasricha, de Monte and Gupta have produced experimental evidence that, in regions like Calcutta where cholera is endemic, there exist bacteriophages under the influence of which in the laboratory certain strains

of atypical non-agglutinating vibrios can acquire the property of agglutination with cholera specific serum.

They conclude that vibriophages play an important part in the epidemiology of cholera and that they are one of the important factors in bringing about a regeneration of degenerated cholera vibrios.

REPORT ON AN INVESTIGATION INTO THE CAUSES OF MATERNAL MORTALITY IN THE CITY OF MADRAS. BY A. L. MUDALIYAR, M.D., F.C.O.G. GOVT. PRESS, MADRAS. PRICE, 12 Annas

The need for inquiry into the factors influencing maternal mortality has been generally appreciated in western countries and in most investigations similar to that reported by Dr. Mudaliyar have already been completed. It may safely be said that western countries have for the moment little more to learn from statistical surveys and that their concern now is to put into operation recommendations based on established data. In India accurate statistical knowledge of the immediate and remote causes of abnormal pregnancy and difficult labour or the results therefrom simply does not exist and the present report is welcome not only for its intrinsic value as the first complete survey of the problem as it exists in one large city in India, but as an indication that the time is not far distant when province as well as city will set itself to a consideration of how improvement in the circumstances of childbirth can be effected.

The inquiry lasted over a twelve months' period; 436 maternal deaths were investigated and recorded on the form represented in appendix I. Dr. Mudaliyar does not claim absolute accuracy either for the figures, the diagnosis of the cause of death, or for the assessment of the point at which failure in the care of the patient first occurred. Lack of medical certification, the time interval between the death and the investigation, the ignorance, prejudice and superstition of the relatives, together with the unreliability of their statements, preclude such a claim, but despite these acknowledged handicaps the report contains a large amount of valuable information and permits conclusions of a reasonable degree of reliability to be drawn.

The maternal mortality rate per 1,000 births is given as 16.6 which the author considers represents rather less than the actual state of affairs. That pregnancy and parturition are often overlooked as primary or as secondary causes of death is evident from the difference in the figures supplied by the M. O. H., namely 29.3, and those investigated by the author, namely 43.6, within the same period. The principal causes of death are given as sepsis 29.6 per cent; hæmorrhages, 12.7 per cent; anæmia of pregnancy, 11.5 per cent; and toxæmias of pregnancy, 9.9 per cent.

Diseases and accidents of pregnancy and puerperium account for 23.4 per cent of deaths, the outstanding single cause being the dysenteries, which accounted for 31 per cent of these.

The primary avoidable factor, the first point at which the management of the pregnancy went wrong is considered, as in the Ministry of Health Reports, under four headings—lack or inadequacy of antenatal care, error in judgment, lack of reasonable facilities, and negligence of the patient and her friends. The percentage of deaths attributed to this factor is 53.44, the outstanding factors being the complementary ones of lack of antenatal care and negligence of the patient or her friends. Out of 436 women, 313 were never examined antenatally, 62 were seen only in the last week of pregnancy and in many other cases the care was wholly inadequate. One hundred and one deaths are classed as due to failure of antenatal care and 62 as due to negligence of the patient. The difference in English and Indian figures under this heading are striking.

Age, 'parity', the spacing of pregnancies, social circumstances in their bearing on maternal mortality are

reviewed in part II of the report. The graph facing page 20 is very instructive and justifies the stress laid by the author on the need for 'a deeper understanding of the necessities of the multipara', a greater regard for 'the spacing of pregnancies' and the value of contraceptive measures.

The rôle of the maternity institution is considered in detail and the need for efficiency in administration, staffing, planning, and equipment as well as sufficiency of accommodation receives a much-needed emphasis. Thirty per cent of the total confinements take place in institutions but as the number of beds available for maternity cases is unfortunately not given and it is impossible to gauge whether the degree of overcrowding, with its attendant dangers, is as serious in Madras as in other cities.

The midwife is recognized as the all-important factor in promoting better midwifery and much space is devoted to the important subject of the health and character, educational qualifications, training and employment of one on whom fall heavy responsibilities for the life or death and the subsequent health of the mother. Dr. Mudaliyar does not apparently contemplate the training of the indigenous dai even as a stopgap. It seems that he will allow her to continue her dangerous trade without let or hindrance until she can be ousted by the trained midwife. His plan presupposes a sufficient supply of good material to be trained and sufficient training schools of a satisfactory high standard to train it—an ideal not likely to be reached for years to come in many parts of India.

The conclusions drawn by the author are that the chief drawbacks to organized attack on the maternal mortality problem are lack of co-operation between the various agencies, namely, general public, doctors, midwives, municipal maternity and child-welfare schemes and institutions and the lack of a proper personnel and trained staff to run the services. He quotes Sir George Newman's remark that no administrative scheme can change errors in judgment, technique and management and points out the danger of rushing through projects for better maternity without proper safeguards in the direction of staffing.

In connection with the plea for a uniform standard of statistics, the warning given in an earlier chapter on the futility of relegating the compilation of vital statistics to clerks and to those who have neither the interest nor the intelligence to appreciate their real worth might very well be repeated. Health officers, judging from the reports, only too readily offend in this matter.

The report is the work of an authority; it deserves careful study and one hopes it will provide the much-needed stimulus to set on foot a widespread movement for the improvement of the midwifery services in India.

ANNUAL REPORT ON THE WORKING OF HOSPITALS AND DISPENSARIES UNDER THE GOVERNMENT OF BENGAL FOR THE YEAR 1932. BY COLONEL A. H. PROCTOR, D.S.O., V.H.S., M.D., I.M.S., SURGEON-GENERAL WITH THE GOVERNMENT OF BENGAL (OFFG.)

This report, apart from the general data of hospitals, dispensaries, incidence of disease, mortality, etc., should be of interest to those concerned with medical education and the whole future of scientific medicine in India.

CALCUTTA HOSPITALS AND DISPENSARIES

Number of institutions.—Forty-four hospitals and dispensaries including the Howrah General Hospital were working in Calcutta at the beginning of the year under report. No new dispensaries were opened nor were any of the existing ones closed during the year.

Patients treated.—Altogether 860,540 patients were treated in the Calcutta institutions, 57,177 were inpatients and 803,363 outpatients as compared with a total of 801,150, viz, 55,063 indoor and 746,087 outdoor

patients, in the previous year; thus there was an increase of 59,390 patients, which is mainly due to an increasing appreciation of scientific medicine and the general popularity of the Calcutta institutions.

Nursing.—On account of the financial difficulties of the Calcutta Hospital Nurses' Institution the recruitment of probationers was stopped from January till August 1932. Although it was re-opened, the nursing staff at the Medical College Hospitals remained insufficient throughout the year. Moreover the number of extra beds increased considerably, especially in the diphtheria and female wards of the Medical College hospitals, thus greatly increasing the work of the already overworked nurses.

It is pointed out that the stoppage of recruitment of probationers is now beginning to be felt in the lack of senior nurses.

DISEASES

Cholera.—The outbreak of cholera in the year 1932 was of a comparatively mild character. The total number of cases treated for this disease was 2,448 against 2,427 in 1931. The mortality among the indoor patients was 536 against 461 in the previous year.

Dysentery.—There were 14,588 patients treated for dysentery during the year under report against 15,020 in 1931, i.e., a decrease of 432 patients. The number of deaths recorded in the indoor department was 236 against 293 in the previous year.

Kala-azar.—Four thousand seven hundred and sixty-four patients were treated against 6,322 in 1931, showing a decrease of 1,558. There were 90 deaths against 115 in the previous year.

Malaria.—The total number of patients treated was 65,467 against 59,227 in the preceding year, showing an increase of 6,240; the number of deaths being 130 as compared with 101 in 1931.

Leprosy.—One thousand four hundred and thirty patients were treated for leprosy in the general hospitals against 1,278 in 1931—an increase of 152 cases. Only 12 cases were treated in the indoor wards with no record of death.

Influenza.—There was a noticeable increase of influenza cases during the year under report. A total number of 28,169 patients were treated in the Calcutta hospitals in 1932 against 25,733 during the previous year—an increase of 2,436 patients.

Smallpox.—This disease prevailed in a rather milder form during the year under report. The number of cases recorded for this disease in the Calcutta hospitals and dispensaries was 391 against 501 in 1931—a decrease of 110. In the indoor wards there were 273 cases with 92 deaths against 424 with 140 deaths in the preceding year. The death rate was 33.70 against 33.02 in 1931.

Tuberculosis of the lung.—The total number of patients suffering from this disease was greater than that of the previous year, viz, 10,035 as against 8,525 in 1931. The largest number of patients was treated in the Medical College hospitals, viz, 4,261 against 2,848 in the previous year. Next comes the Campbell hospital with a record of 1,088 cases against 1,278 in 1931. In the indoor wards of the Calcutta hospitals there were 1,131 cases with 421 deaths against 1,367 cases with 611 deaths in the preceding year.

Beri-beri.—The total number of patients treated for this disease during the year under report was 3,247 as compared with 1,854 cases in 1931, showing an increase of 1,393 cases. Among the indoor patients there were 29 deaths against 3 in 1931.

Diseases of the eye.—The total number of patients treated for the diseases of the eye was 78,372 against 71,897 in the preceding year—an increase of 6,475. The eye department of the Medical College hospitals treated the largest number of these patients, viz, 32,866 against 28,578 in 1931. The increase is an indication of the popularity which the eye departments of the Calcutta hospitals, especially of the Medical College hospitals, are gaining year by year.

Diphtheria.—A separate arrangement for the treatment of diphtheria cases exists in the Medical College hospitals. The total number of cases treated in the Medical College hospitals was 174, of which 165 were inpatients and 9 outpatients. The mortality among the inpatients was 89 or 53.93 per cent.

Veneral diseases.—The total number of patients treated for all sorts of venereal diseases in the indoor and outdoor departments of the Calcutta hospitals was 31,190 (22,646 males and 11,544 females) as compared with a total of 28,123 (20,824 males and 7,299 females) in the preceding year. Of these 9,272 males and 4,281 females suffered from gonococcal infection, 8,424 males and 4,643 females from syphilis, and 4,950 males and 2,620 females from other diseases of venereal origin.

Surgical operations.—During the year under review, 59,181 operations were performed on 49,958 patients in all classes of Calcutta hospitals as compared with 58,847 operations on 50,012 patients in the preceding year. The number of fatal cases was 679 against 487 in 1931.

MOFUSSIL HOSPITALS AND DISPENSARIES

Number.—The year opened with 1,178 allopathic, 67 homœopathic, 19 ayurvedic and 9 unani dispensaries in the districts outside Calcutta. The number of allopathic institutions newly opened during the year was 31 and the number closed 9. Of the newly-opened institutions 26 were local fund, 4 private non-aided and 1 railway dispensaries. Of the number closed, there were 1 state public, 1 local fund, 6 private non-aided and 1 railway institutions. The newly-opened institutions following systems of medicine, other than allopathic, comprised of 2 homœopathic and 2 ayurvedic dispensaries. Of the number closed 5 were homœopathic, 6 ayurvedic and 4 unani. The year thus closed with 1,200 dispensaries giving treatment in allopathic system of medicine and 84 dispensaries following systems of medicine other than allopathic, viz, 61 homœopathic, 15 ayurvedic and 5 unani.

Patients treated.—The total number of patients, indoor and outdoor, treated in all classes of dispensaries, including the temporary and subsidized, etc., outside the town of Calcutta, stood at 9,083,248 as compared with 9,190,434 in 1931, i.e., a decrease of 107,186 patients.

DISEASES

Cholera.—The outbreak of cholera in 1932 was of a comparatively mild character. The total number of cases treated for this disease was 5,521 against 10,510 in the preceding year, i.e., a decrease of 4,989 cases. The mortality among inpatients was 201 as compared with 325 in the previous year showing a decrease of 124.

Dysentery.—A decrease is noticed in the number of cases treated for this disease. There were 195,494 patients in 1932 against 208,870 in 1931—a decrease of 13,376. Only 380 deaths were recorded against a total of 534 in the previous year.

Kala-azar.—The total number of patients treated during the year in the mofussil hospitals and dispensaries for this disease was 55,763 against 60,083 in the previous year, showing a decrease of 4,320. The number of deaths from this disease was 255 against 228 in 1931.

Malaria.—This is the most common disease and accounts for the largest number of patients treated. There was a considerable increase in the number of cases during the year over that in the foregoing year, viz, 2,726,313 in 1932 as against 2,697,076 in 1931, i.e., an increase of 29,237 cases.

A decrease is however noticed in the mortality figure, viz, 285 in 1932 against 340 in the preceding year.

Influenza.—The number of influenza cases showed a noticeable decrease during the year under report. The number of cases came down from 176,753 in 1931 to 132,236 in 1932—a decrease of 44,517 cases.

Smallpox.—The disease appeared in a non-epidemic form during the year under review. Altogether 464

cases were treated in the mofussil hospitals and dispensaries in 1932 as compared with 725 in the previous year—a decrease of 261 cases. The total number of deaths recorded was 29 against 31 in the preceding year.

Tuberculosis of the lung.—The total number of patients treated for this disease in the mofussil hospitals and dispensaries was 11,914 against 11,886 in 1931. The deaths among inpatients were 311 against 297 in the previous year.

Beri-beri.—A sudden rise is noticed in the number of cases treated for this disease in the mofussil areas. The number during the year under report was 5,436 as compared with 1,349 in 1931—an increase of 4,087 patients. The total number of deaths recorded was 18 against 11 in 1931.

Veneral disease.—The number of patients treated for this class of disease as compared with that of the previous year is given below:—

	1931		1932	
	Male	Female	Male	Female
Gonococcal infection.	29,897	6,565	27,875	6,597
Syphilis ..	18,031	5,646	17,165	5,689
Other diseases of venereal origin.	7,618	2,903	8,803	3,576
TOTAL ..	55,546	15,114	53,843	15,862

The number of deaths occurring among inpatients treated for these diseases was 30 against 48 in the previous year.

Leprosy.—Persons treated for leprosy in the mofussil hospitals and dispensaries numbered 4,163 in 1932 as compared with 3,225 in the preceding year, showing an increase of 938 patients.

Surgical operations.—The total number of surgical operations performed during the year in all classes of mofussil hospitals and dispensaries was 146,352 as compared with 143,548 in 1931.

Nursing.—During the year no noticeable improvement was made upon the nursing arrangements existing in the mofussil hospitals and dispensaries. In most of the mofussil Sudder hospitals the nursing work was inadequate and unsatisfactory and was done by the compounders, dressers, ward coolies or by friends and relatives of patients.

General remarks.—The financial difficulties referred to in the last report have not become less. It has not been possible to effect much retrenchment. This is not because of lack of appreciation of the financial position, but owing to the very poor financial provision for medical treatment, before the slump. With a few exceptions hospitals in the past were maintained at the lowest possible level of efficiency. As money became available the tendency was to extend activities rather than to improve the efficiency. The result has been that when faced with a call for retrenchment it meant restricting activities. Public opinion would not allow this course to be adopted. On the other hand any advance in quantity or quality of medical relief has been held up. The present condition of Western medicine and its slow progress present a depressing picture to those who look ahead. It can be said that in Calcutta some progress has been made in the last 20 years, but I do not consider even in this city of two million inhabitants that there is a single hospital which approaches a good provincial teaching hospital in England of twenty years ago.

A nursing committee was appointed during the year under review. It finds that in our largest hospitals

and those responsible for the training of medical men, that nursing is either inadequate or non-existent. Similarly in Calcutta no infectious diseases hospital exists. The necessity for such a hospital increases yearly. In 1912, 844 cases of cholera were admitted with a death rate of 35.6. In the last year 2,448 cases were admitted with a death rate of 22 per cent. Smallpox only provided 79 cases in 1912 as against 391 in 1932. Diphtheria has trebled its admissions in the same period. Cerebro-spinal meningitis has apparently come to stay. Measles, enteric fever, dysentery, influenza and pneumonia are all taking their toll. Not all these can be treated in an infectious hospital but provision should at least be adequate for cholera, smallpox, diphtheria and cerebro-spinal meningitis. Turning to the hospitals outside Calcutta the only advance in quality in the last 20 years is that x-rays have been made available in a number of stations. Even this advance is more apparent than real as expert radiologists are lacking. It is the man behind the machine that makes it valuable.

The surgeon-general points out that in spite of the increase of beds in the mofussil in classes I, III and IV in 1932 as compared to 1912 the increase in patients has failed to keep pace with it. In other words 'confidence in Western medicine is diminishing rather than increasing'. It is further pointed out that what Bengal requires is not more hospitals but better hospital staffs. He suggests that

'A start should be made with those hospitals associated with medical schools. It is not to be expected that doctors trained in these indifferent hospitals can contribute anything to increased public confidence in scientific medicine.

The policy of district medical schools would be sound enough if we could provide really efficient teaching staffs and up-to-date, well-equipped and well-staffed modern hospitals. We provide neither. There would be no demand for ayurvedic, unani and homoeopathic dispensaries if our district hospitals were as good as English provincial hospitals. India is to-day in a state of transition, and whatever may happen in other directions I can see little hope of progress in medicine if India loses touch with the West. Before the War the I.M.S., with its constant infusion of new blood and the frequent visits of its officers to Europe, maintained that touch. To-day the I.M.S. officers are largely reduced in number, many of them rarely visit Europe and then only as junior officers, not as officers of ripe experience.

For this reason particularly I hope that the provision for study leave will not be reduced, either for the Indian Medical Service or Bengal Medical Service'.

ANNUAL REPORT FOR THE YEAR 1933 FROM THE PHARMACOLOGICAL LABORATORIES OF THE PHARMACEUTICAL SOCIETY OF GREAT BRITAIN

This report contains a résumé of the research work carried out by the staff and has several suggestions of therapeutic value for those practising in India.

Experiments on the protective action of calcium on the resistance to poisoning by carbon tetrachloride show that the mortality of the mice given large doses of the drug is markedly reduced if calcium lactate is fed one hour previously.

The laboratory has further shown that yeast, if it contains ergosterol, can become a good source of vitamin D when irradiated. The object of those investigations was to produce a cheap and good supply of this vitamin for the poorer classes of women in India.

THE KASHMIR C. M. S. MISSION HOSPITAL 1934; FIFTY YEARS: A REVIEW

ALTHOUGH the title of this report only claims it to be a review of the fifty years 1882 to 1931 it really covers

a much longer period for it describes the first establishment of the C. M. S. Mission at Srinagar by Mr. R. Clark in 1864 and how shortly afterwards his wife began the first medical work of the mission by opening an out-patient department for women.

In 1865 Dr. Elmslie arrived and at first was mainly engaged in itinerant medical work. It is not clear when the actual hospital commenced but the present buildings were erected in 1886. In 1882 Dr. Arthur Neve took over charge and with the exception of four years has since retained this post until his death in 1919. Dr. Ernest Neve, who is at present in charge of the hospital, first arrived in 1886 and followed his brother as superintendent, so the hospital has now been in charge of one or other of the Neves for over fifty years. This is a remarkable achievement and the record of work disclosed in this report is one of which they might well be proud. In addition to carrying on their medical work the Neves have contributed over seventy papers to various medical journals, and several of these articles have appeared in the columns of this journal. Under the heading of 'Fifty Years Ago' we quoted from one of these in our August number of last year. Dr. Arthur Neve also wrote two books, and Dr. Ernest Neve has written three books descriptive of the country

and the latter has also contributed a manual on Kashmiri grammar and conversation.

In years to come we venture to predict that the work of the two Neves in Kashmir will rank as one of the epics of medical missionary work in the British Empire.

THE PRESIDENTIAL ADDRESS OF THE GOLDEN JUBILEE OF THE BOMBAY MEDICAL UNION. BY JEHANGIR J. CURSETJI, M.D.

THE president in his address gave an interesting account of the growth of the society founded by himself along with two others fifty years ago. Great tribute must be paid to the enthusiasm of its founders and to the loyalty of those who kept it going in the lean years it has sometimes had to pass through since its birth.

A résumé of the work done by the union in promoting, in the broadest sense, the efficiency and prestige of the profession in India is given. The reply to the memorandum of the British Medical Association is discussed; this includes some relevant issues on medical education, the efficiency of personnel, economy of administration, and medical research in India.

Correspondence

STUDY OF VITAMIN-A DEFICIENCY IN CEYLON

To the Editor, THE INDIAN MEDICAL GAZETTE:

SIR,—We have read with great interest the 'Study of Vitamin-A Deficiency in Ceylon' by Dr. L. Nicholls, published in the May number of the *Indian Medical Gazette*. May we, however, suggest that the syndrome he describes is a wider deficiency than merely that of vitamin A. The sore mouth and 'neuritis' symptoms have been described as pellagrous by Stannus (see, for example, his review of the subject in *Trans. Roy. Soc. Trop. Med. and Hyg.*, Vol. XXIII, p. 627). Our own observations upon a disease found in Malayan prisons in which the chief symptoms are sore mouth and eczema of the scrotum lead us to believe that this syndrome is due to vitamin-B deficiency. Our conclusions are largely based upon therapeutic tests.

We have not found phrynodermia common but there is no doubt that deficiency diseases vary from country to country. Dr. Nicholls himself says of the incidence of phrynodermia and sore mouth, 'the conditions do not follow one another in uniform curves'. This point suggests that two separate deficiencies may be present. Therapeutic tests would be of great interest in the conditions that Dr. Nicholls has described.

Yours, etc.,
J. V. LANDOR.
R. A. PALLISTER.

GENERAL HOSPITAL,
SINGAPORE,
16th June, 1934.

STUDY OF VITAMIN-A DEFICIENCY IN CEYLON

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR,—Drs. Landor and Pallister appear to consider that in my paper (1934) in your May issue I went astray in attributing 'sore mouth' and certain 'nerve' symptoms to vitamin-A deficiency; they refer to a review by Dr. H. S. Stannus (1930) and to their experiences in Malayan prisons. They suggest that 'sore mouth' and 'neuritis' are due more probably to vitamin-B deficiency. As they refer to the review of Dr. Stannus I conclude they mean principally B.

Since writing the paper I have cut sections of the spinal cords of children who have died after showing symptoms of what I termed 'neuritis'. These sections show early myelin degeneration in patches in the posterior and lateral columns, and also the anterior horn cells appear to have undergone changes. (The method of preventing post-mortem changes has been to inject 30 c.c.m. of 10 per cent formalin in normal saline into the spinal canal soon after death; this preserves the cord pending permission for the post-mortem examination.)

An apparently similar condition occurs in pellagra and pernicious anaemia. But several observers (Hart, Miller and McCollum, 1916; Hughes, Lienhardt and Aubel, 1929; and E. Mellanby, 1926) have described these changes in cords of animals which have been fed on diets deficient only in vitamin A. It is not astonishing that a degeneration of nervous tissue has more than one cause.

I became familiar with pellagra when stationed for four years in the West Indies; and during many years in Ceylon I have searched hospitals, a vagrant home, many prisons, and a large mental asylum for cases of pellagra, but I have never found a case.

'Sore mouth' is prevalent in the vernacular schools, and 'neuritis' and 'sore mouth' are prevalent in the prisons and the asylum, and, if they were due to deficiency in B, it is reasonable to expect that cases of pellagra would occur.

In the review above referred to Dr. Stannus commences by referring to the work of E. J. Wright (1928), who attributes soreness of the angles of the mouth, and skin changes of the scrotum to vitamin-A deficiency.

The signs and symptoms of vitamin-A deficiency are common in Ceylon and a careful consideration of the diets of the children in vernacular schools, prisoners in jails and patients in the asylum showed that they were deficient in vitamin A, but a deficiency in vitamin B was not apparent.

It was for these reasons that I attributed 'sore mouth' and 'neuritis' to vitamin-A deficiency.

It is probable that the signs and symptoms of vitamin deficiencies, which result from a generally poor diet, are not due to single factors. But when reporting preliminary investigations it is necessary for clarity to emphasize the most salient deficiency of the diets in question.

The elucidation of dietary deficiencies in man is an involved subject and must be a very slow process, because there are many possible interactions between the numerous constituents of various diets.

Even to-day many observers are not satisfied that a deficiency of B₁ is a complete explanation of beri-beri; nor that a deficiency of B₂ and a diet containing proteins deficient in certain amino-acids is a complete explanation of pellagra.

The present state of our knowledge indicates that pathological changes may arise from:—

- (1) The absence of a vitamin in the diet.
- (2) The existence of certain substances in the diet which have a toxic effect when vitamins are deficient.
- (3) Insufficient proteins of high biological value coupled with some vitamin deficiency.

I have carried out recently some dietary and therapeutic experiments; the results will be published later, but one point is clear that when vitamins combined with proteins of high biological value (such as 2 eggs daily) are added to the diets, 'sore mouth' clears up usually within a week to ten days, and prynoderma clears up, but requires more time, probably because the pathological changes are more profound. Yet when apparently ample vitamins are given in leaves, cod-liver oil, dāl, green gram, and fruits, these signs clear up but take a very much longer time.

- (4) Vitamins require a certain balance between the mineral constituents of a diet.

For instance Theiler has shown that when horses and cattle are fed on a diet low in calcium and high in phosphates, the horses develop osteoporosis and the cattle thrive; whereas when the diet is high in calcium and low in phosphates the horses thrive, but the cattle

develop 'bone changes'. Two other factors may be added:—

- (5) The vitamins are present in the diet, but a disordered alimentary canal cannot absorb them.

This has been suggested as the cause of alcoholic neuritis.

The signs, symptoms and pathology of sprue resemble those arising from vitamin deficiencies, and it is possible that an intestinal indigestion which prevents the absorption of fats, also prevents the absorption of fat-soluble or other vitamins.

- (6) A disordered metabolism may affect the normal assimilation of necessary constituents in the diet.

Perhaps pernicious anaemia falls under this heading.

REFERENCES

- Hart, E. B., Miller, W. S., and McCollum, E. V. (1916). *Journ. Biol. Chem.*, Vol. XXV, p. 239.
 Stannus, H. S. (1930). *Trans. Roy. Soc. Trop. Med. and Hyg.*, Vol. XXIII, p. 627.
 Hughes, J. S., Lienhardt, H. F., and Aubel, C. E. (1929). *Journ. Nutrition*, Vol. II, p. 183.
 Mellanby, E. (1926). *Journ. Physiol.*, Vol. LXI, p. xxiv (sic).

Yours, etc.,

LUCIUS NICHOLLS, M.D., B.C., B.A. (Cantab.),
 Director.

BACTERIOLOGICAL AND PASTEUR
 INSTITUTES,
 COLOMBO,
 12th July, 1934.

Service Notes

APPOINTMENTS AND TRANSFERS

THE King has approved the following appointment:—

Major-General D. P. Gail is appointed Honorary Physician to the King, 15th November, 1933, *vice* Major-General Sir John W. D. Megaw, K.C.I.D., retired.

Lieutenant-Colonel G. Covell, an officer of the Medical Research Department, is placed on foreign service under the Association of the Pasteur Institute of India, Kasauli, for appointment as Officiating Director of that Institute, with effect from the date on which he assumes charge of his duties.

Lieutenant-Colonel M. Das, M.C., Superintendent, Bengal Jail Department, is confirmed in that appointment, with effect from the 20th September, 1932.

His Excellency the Governor, with the concurrence of the Honourable Minister for Local Self-Government, is pleased to appoint Lieutenant-Colonel A. H. Harty, Civil Surgeon, Poona, to hold charge of the post of Superintendent, Central Mental Hospital, Yeravda, in addition to his own duties, during the period of the extension of leave for 2 months granted to Major E. C. A. Smith by the High Commissioner for India. The appointment should take effect from the date from which Lieutenant-Colonel Harty takes over from Captain Taylor.

The services of Major G. C. Maitra, an Officer of the Medical Research Department, are placed temporarily at the disposal of the Government of Burma, for appointment as Officiating Director, Pasteur Institute, Rangoon, with effect from the date on which he relinquishes charge of his present duties as Officiating Director, Pasteur Institute of India, Kasauli.

Major R. M. Kharegat, an Agency Surgeon, is posted as Chief Medical Officer in Central India and Residency Surgeon, Indore, with effect from the afternoon of the 31st May, 1934.

The services of Major S. R. Prall and Major J. S. Galvin are placed permanently at the disposal of the

Government of Bombay, with effect from the 26th June, 1932.

Major A. C. Chatterji is appointed to officiate as Health Officer, Simla, with effect from the 20th May, 1934, *vice* Major S. N. Makand granted leave.

Major J. J. Rooney is appointed substantively to be an Agency Surgeon under the Government of India in the Foreign and Political Department, with effect from the 9th April, 1934.

Major S. Nag, Civil Surgeon, Murshidabad, is appointed as Civil Surgeon, Mymensingh.

The services of the undermentioned officers are placed permanently at the disposal of the Government of the United Provinces, with effect from the date mentioned against each:—

1. Major W. Aitchinson, 1st February, 1932.
2. Major A. J. C. Culhane, 27th January, 1932.
3. Captain C. V. Falvey, 26th January, 1932.

The services of the undermentioned officers are placed temporarily at the disposal of the Local Government specified below, with effect from the date mentioned against the name of each officer:—

Government of Bombay

Major T. A. Doran, 11th June, 1934.

Government of Bengal

Captain E. G. Montgomery, 8th June, 1934.

Captain G. B. W. Fisher, 11th June, 1934.

Government of United Provinces

Captain D. P. Lambert, 13th June, 1934.

Government of Assam

Captain P. H. Cummius, 1st June, 1934.

The services of Major V. S. R. Pandit are placed temporarily at the disposal of the Government of Burma for employment in the Burma Jail Department, with

effect from the date that he assumes charge of his appointment.

The services of Brevet-Major M. S. Gupta are placed at the disposal of the Government of Madras for employment in the Madras Jail Department, with effect from the date on which he assumes charge of this appointment.

The services of Captain K. S. Fitch are placed temporarily at the disposal of the Government of Bengal, with effect from the 26th May, 1934.

Captain K. S. Fitch is posted as Civil Surgeon, Midnapore, *vice* Captain R. Linton, transferred.

Captain R. Linton, Civil Surgeon, Midnapore, is appointed as Civil Surgeon, Barisal.

Captain E. G. Montgomery is posted as Civil Surgeon, Murshidabad, *vice* Major S. Nag, transferred.

Captain G. B. W. Fisher is placed on general duty at the Medical College Hospitals, Calcutta, with effect from the 11th June, 1934.

The undermentioned officers are confirmed in the rank of Captain:—

B. D. Khurana.

E. H. Lossing.

R. J. Jarvie.

M. Sendak.

G. W. Miller.

To be Captain (on probation)

Ilahi Bakhshi, dated 3rd May, 1933, with seniority 5th April, 1932.

(Previous notifications so far as they related to this officer are cancelled).

Lieutenant W. J. Stewart, Medical Officer, Kitchener College Hospital, Nowgong, is appointed to officiate as Agency Surgeon, Bundelkhand, in addition to his own duties, with effect from the forenoon of the 25th May, 1934.

PROMOTIONS

The following promotions are made, subject to His Majesty's approval:—

Lieutenant-Colonel to be Colonel

A. A. McNeight. Dated 1st April, 1934, with seniority 1st August, 1928.

The promotion of Major A. H. Craig to the rank of Major is antedated to 23rd September, 1931.

Captain to be Major

C. V. D. Rose. Dated 25th October, 1931.

Captains on (probation) to be Majors (on probation)

P. V. Karamchandani. Dated 26th February, 1934.

R. K. Misra. Dated 2nd April, 1934.

Lieutenants to be Captains

W. A. N. Marrow. Dated 2nd February, 1934.

H. B. Macevoy. Dated 3rd February, 1934.

M. M. Mansfield. Dated 3rd February, 1934.

J. Guthrie. Dated 3rd February, 1934.

W. J. Stewart. Dated 3rd February, 1934.

R. I. Reid. Dated 8th February, 1934.

J. D. Grant. Dated 20th April, 1934.

W. H. G. Reed. Dated 1st May, 1934.

T. E. Palmer. Dated 1st May, 1934.

D. G. McCauly. Dated 1st May, 1934.

F. C. Jackson. Dated 1st May, 1934.

J. W. Bowden. Dated 1st May, 1934.

J. D. Murdoch. Dated 1st May, 1934.

A. T. Andreasen. Dated 1st May, 1934.

J. M. Slater. Dated 1st May, 1934.

D. R. Tweddie. Dated 1st May, 1934.

C. F. Garfit. Dated 1st May, 1934.

D. K. L. Lindsay. Dated 1st May, 1934.

W. S. Morgan. Dated 1st May, 1934.

M. S. Purvis. Dated 1st May, 1934.

M. E. Kirwan. Dated 1st May, 1934.

R. D. MacRae. Dated 1st May, 1934.

C. J. H. Brink. Dated 1st May, 1934.

W. Maekie. Dated 1st May, 1934.

J. W. Richmond. Dated 1st May, 1934.

G. S. N. Hughes. Dated 1st May, 1934.

A. D. Barber. Dated 1st May, 1934.

Lieutenants (on probation) to be Captains (on probation)

M. Ata-Ullah. Dated 20th April, 1934.

G. B. Thomas. Dated 1st May, 1934.

J. White. Dated 1st May, 1934.

H. A. Ledger. Dated 1st May, 1934.

T. F. O'Donnell. Dated 1st May, 1934.

W. W. Laughland. Dated 1st May, 1934.

S. Ahmad. Dated 1st May, 1934.

C. C. Kapila. Dated 1st May, 1934.

F. W. Allinson. Dated 1st May, 1934.

F. R. Cawthorn. Dated 1st May, 1934.

F. V. Stonham. Dated 1st May, 1934.

J. M. Mathew. Dated 1st May, 1934.

W. B. Stiver. Dated 1st May, 1934.

L. Feinhols. Dated 1st May, 1934.

J. G. Stonham. Dated 1st May, 1934.

G. F. Harris. Dated 1st May, 1934.

F. W. Whiteman. Dated 1st May, 1934.

F. C. Leach. Dated 1st May, 1934.

W. M. E. Anderson. Dated 1st May, 1934.

R. D. Scriven. Dated 1st May, 1934.

V. M. Albuquerque. Dated 5th June, 1934.

LEAVE

Lieutenant-Colonel W. L. Harnett, C.I.E., is granted leave from the 6th June to the 6th December, 1934.

Lieutenant-Colonel R. N. Chopra, C.I.E., Professor of Pharmacology, School of Tropical Medicine, Calcutta, is allowed leave for 1 month, with effect from the 16th July, 1934.

Lieutenant-Colonel M. A. Nicholson, an Agency Surgeon, is granted leave for 3 months and 20 days, with effect from the afternoon of the 31st May, 1934.

Major H. H. Elliott, M.B.E., M.C., an Agency Surgeon, is granted 2 months' leave, with effect from the afternoon of the 12th May, 1934.

Major S. N. Makund, Health Officer, Simla, is granted leave for 26 days, with effect from the 20th May, 1934.

RETIREMENTS

The King has approved of the following retirement:—

Colonel G. C. L. Kerans, D.S.O., retires, 1st April, 1934.

Captain J. S. B. Forde, relinquished his probationary appointment, 28th February, 1934.

The following retirement is permitted, subject to His Majesty's approval:—

Lieutenant-Colonel A. W. Overbeck-Wright. Dated 30th May, 1934.

Notes

THE MANIPULATOR: A NEW DEVICE FOR ISOLATING BACTERIA UNDER THE MICROSCOPE

In the *Zentralblatt für Bakteriologie*, Part 1 (Originals), 1933, Vol. CXXIX, a new plate manipulator has been devised which enables single bacteria to be taken at any time with rapidity and certainty, from colonies or mixtures of bacteria, and used for propagating pure cultures (single-cell cultures). The new process differs radically from all the conventional types of micro-manipulators in that the bacteria are not isolated with glass capillaries (micro-pipettes) from a drop of liquid containing the bacteria, but isolation is performed with an extra-fine metal needle on the surface of the ordinary agar plates, and any transparent culture medium can be used. The needle is made of a special metal, and despite its extreme fineness (diameter at the point is approximately 0.0005 mm.), it can be sterilized

by heat like an ordinary platinum loop. With the needle, it is surprisingly easy to isolate a single bacteria under the microscope and to displace it several centimetres on the surface of the culture medium. When it makes contact with the agar, the needle forces a small drop of liquid out of it and the bacterium floats after the needle, so to speak, during the motion of the latter. In this way, single bacteria can be transported to Indian ink marks previously made on the surface, and this makes it an easy matter to locate again the colonies that have sprung from them, and to inoculate them. Several of such single-cell cultures can be made on one plate. In addition, one or more bacteria can be transferred to a new plate and the needle used, in this way, for the cultivation of microscopic colonies of bacteria. The magnifications ordinarily used range between $\times 500$ and $\times 800$ (high power dry systems).

Objectives constructed specially for the purpose and having a specially large working distance make the process very convenient to work with, and no special skill is required. Even the proteus, so redoubtable as an impurity, can be isolated from soil. As the process only takes a few minutes, the new method can be used by bacteriologists for the pure culture of bacteria from mixtures, thus considerably curtailing the time necessary for making the cultures. One important advantage of the plate manipulator is that it is always ready for use. The apparatus and the microscope are mounted on a common base-plate; but, when the microscope is not being used for manipulations, the metal bracket carrying the micro-needle can be swung clear on a vertical axis, thus allowing the microscope to be used for other purposes as well. When the instrument is required for use, a single manipulation brings the needle into the correct position underneath the objective. Any bacteriological microscope having a mechanical stage can be used. The new manipulator is manufactured by C. Reichert, Optical Works, Vienna.

DAKOL AGAR

THIS valuable agar preparation is packed in convenient sixteen-ounce bottles with white enamel screw caps, the mouth of the bottle being wide enough to allow of the insertion of a dessert spoon. It has a specially palatable flavour, and, as it is manufactured by a firm with a well-established reputation, those using it can rely upon the high quality of the product. It is supplied either plain or with phenolphthalein ($1\frac{1}{2}$ grains in each fluid ounce) and is available also in an eight-ounce size.

The price is very reasonable.

VINVITÆ

VINVITÆ contains, in a readily assimilable form, the glycerophosphates of iron and calcium, together with other mineral salts essential to the metabolism of the human body. The tonic is also reinforced with lecithin, guaiacol, malt, the active principles of cod-liver oil and a very small amount of strychnine hydrochloride. It is specially suitable for persons with weak digestions and is not constipating in action. Clinical experience has proved the value of this tonic over a period of many years for those who are suffering from the after-effects of fever, who are recovering from illness or who desire to improve their general condition.

G. H. ZEAL, LIMITED

Owing to the rapid expansion of their business, it has become necessary for the well-known firm of thermometer manufacturers to find increased space to accommodate their staff and equipment.

They are therefore building a modern north-light ground-floor factory, which they claim will be the largest and best equipped factory for the production of thermometers in Great Britain, if not in the world.

They hope to be fully established in their new works

early this year, when they will be in a position to increase their output very considerably and maintain an even higher standard of quality and better service for delivery than they have done in the past.

The new address of this firm will be G. H. Zeal, Limited, Thermometer Manufacturers, Morden Road, Merton, London, S.W. 19, England.

CHANGE OF ADDRESS

D. J. KYMER AND COMPANY, the old-established advertising agency who have for some years specialized in advertising medical products in the British Empire, and who have within the last decade opened branch offices in Calcutta and Bombay, have found it necessary on account of expansion of business to move from their previous office at 1/3, Whitefriars Street to larger offices in Australia House, Strand, London, W.C. 2.

BURROUGHS WELLCOME AND COMPANY AND DARTFORD

LAST year, His Majesty King George V of England presented the town of Dartford with a charter, incorporating it as a Municipal Borough. As the event was an important one from a local point of view, Messrs. Burroughs Wellcome and Co., whose large drug factory forms a very important feature of this (now) municipal borough, marked the occasion by issuing a very interesting souvenir.

This souvenir, which is a most attractive production, gives a short review of the important historical events that have occurred at Dartford and a short description of the town as it is to-day. There are a number of photographs, including one of this firm's chemical works, flood lighted on the occasion of the Faraday centenary celebrations.

INFANTS' FOODS IN INDIA

THE excessive duty of 25 per cent on Infants' Foods imported into India continues to constitute a heavy and unnecessary tax on parenthood and the infant life of the nation. In a country such as this where these foods are a vital necessity such a tax seems very unfair, and protests have already been laid before the Government.

Repacking of these foods in India in order to escape the full incidence of the duty has already been discussed and indeed adopted in one case by a well-known brand of Colonial food.

Messrs. Cow and Gate have, however, decided that such a step would not be in the interests of their customers and they do not intend to ship their particular food to India in bulk and repack it under tropical conditions. The following statement expresses their attitude:—'Our food will continue to be made in England, and packed and shipped immediately after manufacture in sealed and dated tins, as heretofore. We can conceive of no other method of putting Cow and Gate in the hands of the mother in India and at the same time of giving the absolute guarantee of condition and security which we have always given. While we are intensely anxious to see a reduction in, or the elimination of, the present heavy and anti-social duty we prefer to bear its full brunt rather than to risk lowering our standard of hygiene and safety in the slightest degree. Although our food cannot therefore be reduced in price, we believe we shall continue to have the support and custom of our many friends and clients throughout India who appreciate to the full the vital importance of supreme hygiene in connection with a product of this nature'.

HALLUX VALGUS AND HALLUX RIGIDUS SPLINTS

(POST-OPERATIVE)

THE hallux valgus splint is a modification of Jones's, whose splint has always been found difficult to keep in

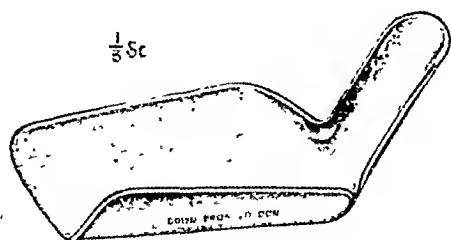
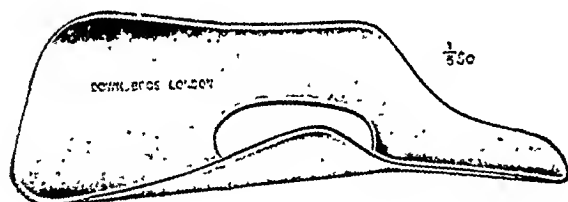
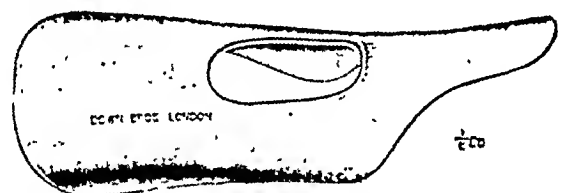
position on the toe. It is made of aluminium and has the advantage of fitting closely to the inner border of the forepart of the foot, so that displacement does not take place.

The splint consists of a body and toe-piece. The toe-piece fits to the inner side of the big toe and inclines slightly to the medial side. The body grasps the medial side of the forepart of the foot; its lower border which comes in contact with the sole of the foot is straight; its upper border is cut away to fit the dorsum. It contains a window at the side to prevent pressure on the wound.

After the wound is dressed the toe is fastened to the toe-piece with adhesive strapping. A second piece of strapping surrounds the forepart of the foot and the body of the splint. No further dressing or bandage are required.

It is customary to apply a hallux valgus splint after operating for hallux rigidus. As the aim of the operation is to procure dorsi-flexion of the big toe which has been lacking, a special splint has been designed to hold the toe in this position. The structures beneath the joint have long been contracted as a result of disuse, and by placing the toe in the dorsi-flexed position we keep these structures on the stretch and prevent any further tendency to contraction.

This splint is also made of aluminium and consists of a toe-piece almost at right angles to the body, to



this the toe is strapped with adhesive plaster after the operation. The body of the splint fits to the forepart of the sole and its inner edge is raised to grasp the inner border of the foot, adhesive strapping secures it in position.

There are right and left splints which are made in two sizes, one to fit the male foot and the smaller to fit the female.

It is to be found that, since placing the toe in the dorsi-flexed position after operation, the patient experiences much less pain when movements are started, that the results on the whole are better and that recovery is more rapid.

These splints have been in use for the past five years and have been found entirely satisfactory.

They are made by Messrs. Down Brothers, Limited, London, for Mr. R. Wood Power, F.R.C.S., of Hereford, England.

MALNUTRITION

THAT in most provinces in India the ordinary diet of the people is far from perfect and notoriously wanting in elements essential for the maintenance of the human body, even in ordinary good health, is well known to all. The investigations carried out by the students' welfare committee of Calcutta some years ago revealed the astonishing fact that, out of every ten students, six were suffering from some defect or other, two were entire wrecks, and only two were physically fit. The chief defect was found to be malnutrition. This malnutrition can be remedied only by including in our daily food articles which will tend to give it that balance and scientific proportion necessary to make our diet as sufficient for the needs of the human system as possible. Here the element of cost should also be taken into consideration. It is useless prescribing an article of food of high nutritious value, if its price is such as to place it beyond the reach of many.

The combination of cheapness and the elements necessary to make a perfect food is found in oats. Quaker Oats, a deservedly popular variety of this cereal, has on an analytical examination been found to contain proteins, carbohydrates, fat, calcium, phosphorus, iron and vitamins B and E in just those proportions needed to make it a valuable food for children, nursing mothers, invalids and even adolescents. Its cheapness is an additional advantage, while the ease with which it can be digested makes it acceptable even to those whose digestive organs have lost much of their vitality.

Publishers' Notice

SCIENTIFIC Articles and Notes of interest to the profession in India are solicited. Contributors of Original Articles are entitled to receive 25 reprints *gratis*; additional reprints can be obtained on payment. No reprints will be supplied unless contributors ask for them at the time of submitting their manuscripts.

Communications on Editorial Matters, Articles, Letters and Books for Review should be addressed to THE EDITOR, *The Indian Medical Gazette*, c/o The Calcutta School of Tropical Medicine, Central Avenue, Calcutta.

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Original Articles

SKELETAL TRACTION BY MEANS OF KIRSCHNER'S WIRE IN THE TREATMENT OF LOWER LIMB FRACTURES

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THE evolution of fracture treatment may be divided into three periods:—

The primitive, from the dawn of history to the end of last century

In all countries and in all ages fractures were treated by tying a piece of wood or metal to the fractured limb, with the idea of holding the fragments in position, after the surgeon had 'set' it by traction and manipulation to bring the broken ends into apposition. As this manœuvre was usually attempted without anaesthesia it frequently failed and, even if it was successful at the time, the retraction of the muscles reproduced the deformity in a few days, so that shortening often accompanied by angular deformity was the usual result. The value of traction in lower limb fractures was beginning to be recognized towards the end of this period, but as it was applied without suspension its efficiency was impaired; the only exception was Hodgen's splint for fractures of the upper end of the femur, a piece of apparatus based on sound principles which is still occasionally used. The introduction of plaster-of-Paris splints was a great advance, as, if the fragments were properly reduced under anaesthesia and the splint was skilfully made without too much padding, it could be relied on to hold the fragments in position long enough to permit of callus formation advancing far enough to fix the fragments. This is still the best method for superficially-placed bones such as the tibia and fibula, when the shortening can be readily reduced, but repeated checking of the position by x-rays after the plaster has been applied is essential, as there is a tendency to recurrence of the deformity when the limb wastes and the plaster loosens. Prolonged fixation in plaster is apt to lead to troublesome adhesions in neighbouring joints and hence much attention has recently been paid to the use of ambulatory methods, which permit of early use of the limb whilst still encased in plaster. Böhler employs an unpadded plaster splint, the accurate fitting of which allows of early weight-bearing without risk of angulation or lateral deviation of the fragments, but it must be admitted that the fitting of a non-padded plaster cast requires great skill and involves more risk to the skin in a tropical country.

The second or operative period initiated by Arbuthnot Lane

Dissatisfied with the results of fracture treatment as then practised, he advocated the treatment by open operation of all fractures which could not be easily reduced, the levering of fractured ends into position and fixing them by steel plates screwed on to the bones. Lane was a great surgeon and in his skilful hands many excellent results were obtained, far in advance of those usual in that day; all his followers, however, had not his technique and the supervention of sepsis was a grave disaster that usually left the patient much worse off than if the fracture had been treated on orthodox lines, and this after a long and grave illness. As time went on it became apparent that the absolute immobility of the fractured ends led to delay in callus formation, that minor grades of sepsis often led to a rarefying osteitis around the screws which necessitated the removal of the plate at a later date and that, even if asepsis was perfect, fibrosis and adhesions amongst the muscles and tendons followed the wide opening up of the parts, so that the functional result was less perfect than the exact anatomical reposition would lead one to expect. The method was never applicable to compound fractures, as the introduction of a foreign body into a potentially or actually septic wound violated all recognized principles of surgery.

Certain recent fractures are still treated by open operation, where there is some intervening soft tissue which absolutely prevents reduction in any other manner, but plates are rarely used nowadays, the wound is closed and skeletal traction is applied exactly as in a closed fracture. Fractures of the patella and the olecranon will always remain suitable cases for operative treatment. Old mal-united fractures for many years furnished an ideal field for this method, and the writer has had a long series of successful results, but latterly better results have been attained with less sacrifice of bone length by the application of skeletal traction after removal of callus and freshening the bone ends.

The third period, opening soon after the beginning of the Great War

It was quickly recognized that any form of fixed splint interfered with the dressing of the severe compound fractures then met with, that traction was essential to correct shortening, and that the traction to be efficient must be combined with suspension, for choice in a skeleton splint of iron which would permit of ready access to the wound. With the development of the treatment of compound fractures by excision of the wound we are not here concerned. The Thomas' splint which had long been used in the Liverpool school for the treatment of fractures of the femur at last came into

its own, thanks to the influence of Sir Robert Jones and the band of workers he gathered round him, and throughout the war it was used with great success in all the British theatres of war. Traction was ordinarily applied by strapping extension, but in the case of fractures of the tibia and fibula the surface of skin available for applying the strapping was insufficient, so that devices, such as Sinclair's skate, gauze affixed by glue or a stirrup passed beneath the tendo Achillis above the os calcis, were utilized. In the case of low fractures of the femur Pearson's modification of Besley's ice-tongs caliper enabled traction to be applied directly to the bone. This latter appliance was a great advance which enabled shortening to be completely corrected in cases where extensive wounds rendered it impossible to obtain sufficient undamaged skin for the application of strapping extensions, but it had several grave drawbacks. Pressure atrophy of the bone was liable to occur, the calipers unless carefully watched might 'creep' and set up infection in the structures of the knee joint and occasionally the supervention of sepsis led to a low form of osteomyelitis of the femur or even arthritis of the knee joint, with delayed convalescence and troublesome stiffness of the joint. In spite of all these drawbacks however the method was much used during the war, both for the femur and applied to the malleoli for fractures of the tibia and the results were so much superior to those obtained by other methods in dealing with the terrible injuries then met with that its drawbacks were condoned. After the war these drawbacks began to appear more important, especially when they occurred in cases of simple fracture and gradually this method of extension lost its popularity. Steinman's pin, a straight steel pin sharpened at one end, which was driven through the bone was an improvement, but its introduction was laborious for the surgeon and the hole left in the bone was large, so that sepsis sometimes followed. This method, always very popular on the Continent, never had much vogue in England.

The position remained stationary until the introduction by Kirschner of Tübingen of the 'piano-wire' method of extension which, almost universally adopted in Germany and in Vienna for the past few years, has only recently begun to be generally used in England.

This is an ideally simple method of obtaining skeletal traction with the minimum of trauma. A wire of rustless steel of one millimetre or two millimetres in diameter according to the weight to be applied (2 mm. is generally preferable) sharpened at one end is driven through the bone. This may be accomplished either by a hand or electrically driven drill, but in any case the slender wire needs to be supported or it would buckle up under the pressure necessary to force it through the bone. There are various devices to accomplish this, but the cheapest and most

efficient apparatus is that illustrated in figure 1, designed by Soutar. It is an ordinary Colt's bone drill worked by hand, with an extension piece of three metal cylinders which telescope into each other. The wire shown in the figure is clamped into the drill chuck and the extension is drawn out as far as necessary to enclose

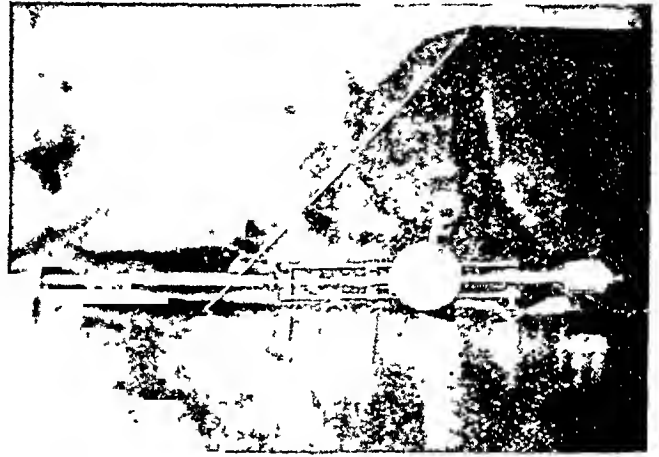


Fig. 1.—Drill with telescopic extension and Kirschner wire.

the wire, leaving about one inch protruding. This is pressed against the part to be drilled and the crown wheel is revolved. As the drill penetrates the tubes telescope into each other until the wire has passed through the bone and appeared on the other side, the drilling is continued until the tubes are completely telescoped into each other. The chuck is then unscrewed and the apparatus disconnected, leaving the wire in the bone. The next step is to put the wire under tension sufficient to stand the pull without buckling. Figure 2 illustrates the stirrup of elastic steel

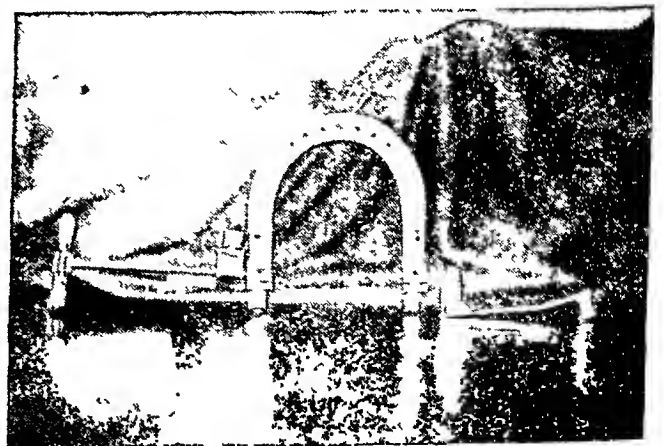


Fig. 2.—Stirrup, tension apparatus and spanner.

used for this purpose. The wire is clamped into the far side of the stirrup, leaving the near-side clamp loose, the screw tension appliance illustrated is then fitted and tightly clamped to the wire. The screw is turned until the wire is under sufficient tension to stand a pull of 15 to 20 pounds, the near-side clamp of the stirrup is

then tightened by the spanner, the clamp on the tension apparatus is released, and it is disconnected, when the stirrup springs apart and holds the wire under tension sufficient to enable it to carry the needed weight. For the femur the best place for the wire is the tubercle of the tibia about half an inch from the surface where the bone is very dense. The limb is put up in a bent Thomas' splint with knee flexed, slung



Fig. 3—Fractured femur with Kirschner wire extension, Thomas' splint and Balkan frame

to a Balkan beam, and 15 to 18 pounds weight, according to the build of the patient, is attached to the stirrup. Extension is maintained for about five weeks, by which time the fracture should be united. The wire is then found to be quite loose and may be cut off and removed without causing pain. A strapping extension is applied for another two or three weeks if there is any doubt as to the firmness of the union, after which a walking caliper splint may be fitted. In many cases union is so perfect that after a further rest of two or three weeks with massage and exercises the patient is able to get up and walk out of the hospital (see figures 3 and 4).



Fig. 4—Near view of figure 3

For a tibia-fibula fracture the wire is passed through the os calcis, the point for drilling the

bone being two finger-breadths below and behind the medial malleolus. The limb is placed in a Braun's splint (figure 5) and the arrangement of

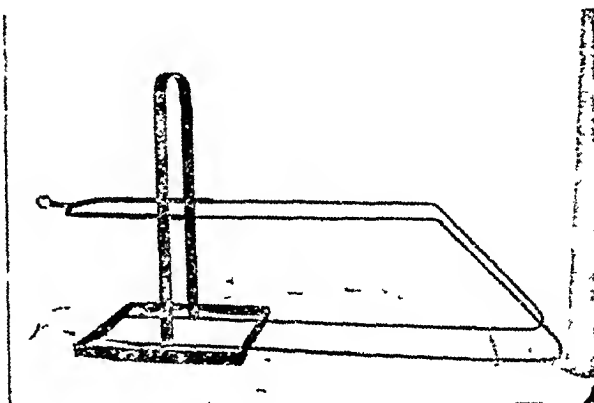


Fig. 5—Braun's splint.

the apparatus is shown in figure 6. Ten to twelve pounds weight is ample—less often suffices—the general principle always being to use only the minimum weight which will suffice to correct shortening without drawing the ends apart. In all cases a sling must be applied to the foot to prevent foot-drop. For tibia and fibula fractures extension may be maintained for much longer; bad compound fractures may need extension for two or three months. In the case of the femur the effect of long-continued traction on the knee joint has to be considered and five weeks is about the limit if the knee joint is not to be rendered unstable by stretching of its ligaments.

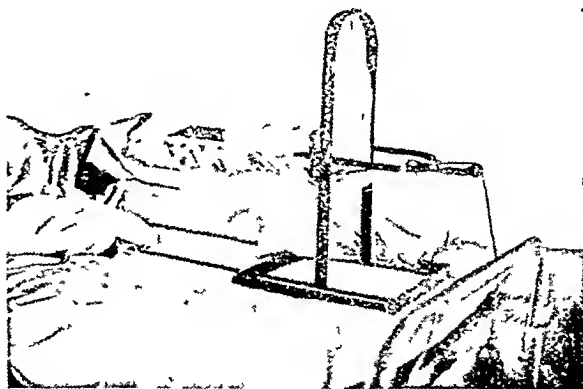


Fig. 6—Arrangements for extension of a tibia-fibula fracture.

Extension may be applied to the humerus by passing the wire through the olecranon and to the radius and ulna by passing it through the lower ends of the bones, but of these methods the writer has no personal experience.

On the Continent the wire is always passed under local anæsthesia, but we find general anæsthesia by evipan sodium very convenient;

it gives 15 to 20 minutes' unconsciousness, quite sufficient to get the limb arranged in the splints. The imperfect relaxation obtained is of no moment, as the extension soon stretches the muscles.

For the past eighteen months all fractures in the upper and lower thirds of the femur have been treated in this way, on account of the tendency to displacement of fragments in these situations. In the middle third excellent results are obtainable by Hamilton Russell's method, as described by the writer (1928), but, if the shortening is considerable or the patient is powerfully built, better results are obtained by the Kirschner wire; this gives less trouble to the nursing staff and we now regard it as the best treatment for these cases too. Fractures above the great trochanter are best treated in Whitman's plaster splint.

Simple fractures of the tibia and fibula may be put up in plaster and treated thus, provided the x-ray shows that the fragments are in satisfactory apposition, but if not the plaster is cut off and a Kirschner wire is put through the os calcis and the limb is placed on a Braun's splint, the method which is used as a routine in all cases of compound fracture after the usual excision of the wound.

In mal-united fractures of the femur or leg bones the method gives results far surpassing those obtainable by plating. If the fracture is not more than two months old it is refractured under full anaesthesia and then treated by extension exactly as a simple fracture, if of longer standing with radio-opaque callus, an open operation is performed, the callus chiselled away, the bone ends freshened to open up the medulla, the wound closed and the extension applied. The resulting shortening is far less than if the ends had to be sawn off to permit of plating; weights of 20 to 30 pounds are easily borne by the wire and the shortening is reduced within a few days, after which the weight is gradually lightened. Needless to say the shock of this proceeding is far less than in a plating operation, and there is little risk of sepsis. When union is well advanced a plaster with a walking iron attachment or a caliper splint complete the treatment. The end-results are most gratifying.

A selection of brief case histories, with some radiograms, will illustrate the points referred to:

Case 1.—S. S. B., Hindu female, aged 58 years. Admitted 8th November, 1932. Old fracture of upper third of right femur four months ago. Shortening 1½ inches. X-ray showed sub-trochanteric fracture with adduction of lower fragment and acute angulation. Refractured on the 20th November and extension 15 pounds applied by Kirschner wire through tubercle of tibia; put up in extreme abduction. Wire removed on the 17th December; discharged on the 5th January, 1933, in plaster-of-Paris splint; subsequently fitted with caliper walking splint.

Final shortening ¾ inch; some adduction recurred owing to breaking up of plaster, but walking well in the splint and satisfactory clinical result.

Case 2.—N., Hindu male, aged 15 years. Admitted on the 6th January, 1933. Recent oblique fracture of lower third of left femur. Shortening one and a half inches (figure 7a). Kirschner wire through tubercle of tibia. Wire removed on the 7th February; extension by strapping for two weeks more. X-ray on the 25th February (figure 7b); discharged 3rd April.



Fig. 7—Case 2. (a) Before extension, and (b) six weeks later.

No shortening and patient able to walk. No caliper necessary.

Case 3.—B. R., Hindu male, aged 30 years. Admitted on the 3rd February, 1933; comminuted fracture of tibia and fibula, half inch shortening. Kirschner wire through os calcis; extension 8 pounds and Braun's splint. Wire removed on the 14th March, and posterior splint applied. Fracture in good position.

Discharged on the 21st April, with good union and no deformity.

Case 4.—B. S., Hindu male, aged 20 years. Admitted on the 24th March, 1933; comminuted fracture lower third of tibia and fibula, compound. Kirschner wire through os calcis; 10 pounds traction, Braun's splint and Carrel-Dakin irrigation to wound. Suppuration in wound needed counter openings on the 15th April and 21st April. Wire removed on the 5th June and plaster-of-Paris splint applied.

Discharged still in plaster on the 21st July with union in perfect position.

Case 5.—A. S., Mahomedan male, aged 25 years. Admitted on the 7th April, 1933. Direct violence fracture of left femur at junction of upper and middle third (figure 8a); showed tendency to adduction of lower fragment, half inch shortening. Kirschner wire through tubercle of tibia, 15 pounds traction and Thomas' splint. Wire removed on the forty-seventh day (the reason for this long retention is not recorded in the notes, probably union was progressing slowly,

but the knee joint was not suffering from the prolonged traction) X-ray on the 28th June (figure 8b) shows perfect position and abundant callus. No caliper necessary.

Case 6.—R. K., Hindu male, aged 30 years. Admitted on the 14th July, 1933. Compound comminuted fracture of left tibia and fibula. Kirschner wire through os calcis; 10 pounds traction, Braun's splint. Wire removed on the 7th September and plaster-of-Paris splint applied.

Discharged on the 13th November in plaster. Wound healed, firm union in good position.

Case 7.—A. M., Hindu male, aged 35 years. Admitted on the 4th August, 1933. Bad compound comminuted fracture of tibia and fibula. Shortening two inches

shortening and angulation. Kirschner wire through tubercle of tibia; 18 pounds weight and Thomas' splint; wire removed on the 19th October.

Discharged on 12th November in a walking caliper. Good union with no shortening.

Case 10.—B., Hindu male, aged 38 years. Admitted on the 8th August, 1933. Old fracture of the left femur of two to three months standing. X-ray showed overlapping and angulation with a lot of callus. Shortening two inches open; open operation on the 18th August, ends trimmed; callus removed; Kirschner wire through tubercle of tibia; 18 pounds weight and Thomas' splint. Wire removed on the fortieth day. X-ray on the 7th October showed a good alignment and abundant callus (figure 9).

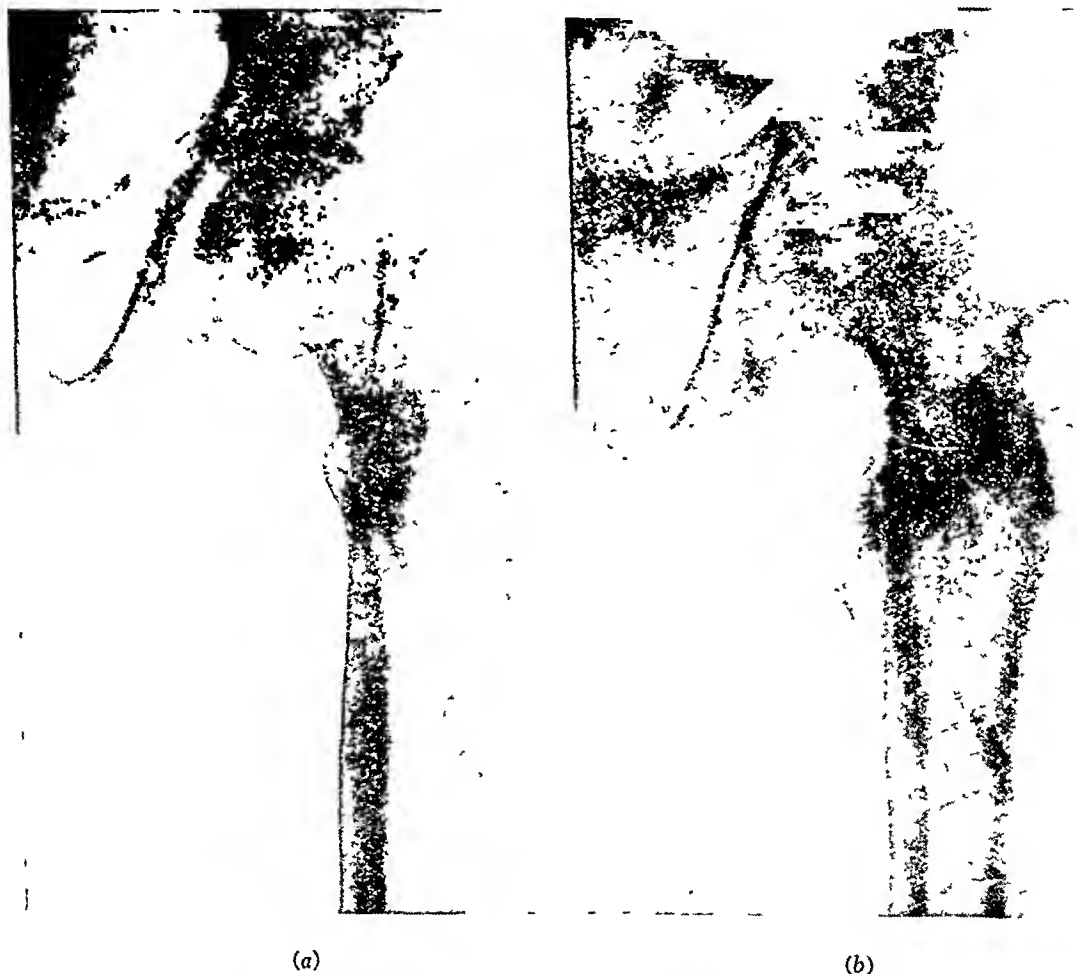


Fig 8—Case 5. (a) Before extension, (b) on discharge 2½ months later.

Kirschner wire through os calcis; 8 pounds weight and Braun's splint. Wire removed on the 22nd September, plaster-of-Paris splint with walking piece applied.

Discharged 13th October with good union and no shortening, still wearing plaster.

Case 8.—M. I., Mahommedan male, aged 8 years. Fracture of right femur two months ago. Shortening one and a half inches, bad angulation. Open operation on the 19th August, using Henry's incision; ends trimmed; Kirschner wire through tubercle of tibia; 9 pounds weight and Thomas' splint. Good union; discharged with no shortening three months later. No walking caliper necessary.

Case 9.—B. K. R. C., aged 24 years. Admitted on the 11th September, 1933. X-ray showed comminuted fracture middle third of the right femur. One inch

Discharged on the 6th November walking with a stick; no shortening and no caliper necessary.

Case 11.—M., Hindu male, aged 10 years. Admitted on the 31st July, 1933. Compound fracture of right tibia and fibula. Wound excised and put up in plaster by Winnet Orr's method. Wound healed but x-ray showed position not good and one inch shortening. Refractured on the 21st September; Kirschner wire through os calcis; 12 pounds weight. Wire removed on the 23rd October and plaster-of-Paris splint.

Discharged 12th November with half an inch of shortening remaining, but good functional result.

Case 12.—K. N. S., Hindu male, aged 19 years. Admitted on the 16th October, 1933. Comminuted fracture upper third of the left femur. Alignment good

but one and a half inches of shortening. Kirschner wire through tubercle of tibia; 15 pounds weight and Thomas' splint. Wire removed on the 18th November.

Discharged on the 6th December in walking caliper splint with good union and no shortening.

Case 13.—B., Hindu male, aged 40 years. Admitted on the 22nd January, 1934. Severe compound comminuted fracture. Wound excised and put up in plaster-of-Paris splint according to the Winnet Orr's method. Severe sepsis supervened and plaster was removed on the 8th February, when the leg was found to be in such a septic condition that the question of amputation was considered. It was decided to put a Kirschner wire through the os calcis with a weight of 10 pounds and to treat by mercurochrome irrigations on a Braun's

was so far advanced four months later that the wire was removed and plaster-of-Paris splint applied. In neither of these cases did the presence of the wire for four months produce any ill effects. The excellent position of the bones will be noted in the skiagram. I think it may fairly be claimed that such results are impossible



(a) (b)
Fig 9.—Case 10 (a) Before operation, and (b) 2½ months later.

splint. The sepsis slowly yielded to this treatment and the condition of the bones on 10th October is shown in figure 10. At the end of May healing of the wound was so far advanced and the bones uniting in such excellent position that the wire was removed after a stay of three and a half months, and a plaster-of-Paris splint was applied. It is unlikely that this limb could have been saved by any other treatment.

Case 14.—A. A. S., Mahomedan male, aged 26 years. Admitted on the 12th February, 1934. Very severe gunshot wound with compound fracture of the right tibia and fibula, the ends of the bones protruding from the wound. Usual excision of wound; Kirschner wire through os calcis; 10 pounds weight; Braun's splint and irrigations of mercurochrome 1 in 1,000. The x-ray (figure 11) shows the condition one month later, the bone is severely comminuted and there are innumerable pieces of metal in the soft parts. In spite of this union



Fig 10.—Case 13 Antero-posterior view.

of attainment in such bad cases by any other method of extension. The apparatus is not expensive and the technique is soon acquired. The patients are very comfortable and the work of the nursing staff is much facilitated.

For specifications of the splints the reader is referred to two excellent articles by

11. R. Rishworth, which appeared this year in the January and March numbers of this journal.



Fig 11—Case 14. Antero-posterior view.

REFERENCE

Harnett, W. L. (1928). The Treatment of Fracture of the Femur. *Indian Med. Gaz.*, Vol. LXIII, p 233

TREATMENT OF COMPOUND FRACTURES OF BONES OF THE LEG BY SKELETAL TRACTION

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THE majority of cases of fractures of both bones of the leg can be successfully treated with splints and plaster applied after proper reduction and without continuous traction. In oblique or spiral fractures, however, there is a tendency for the displacement to recur as soon as the manipulative extension is discontinued, and also in some cases of compound fractures coaptation of the fragments after reduction cannot be maintained unless adequate traction is continued during after-treatment. In compound fractures with a more-or-less trivial external wound and a moderate amount of damage to the underlying soft structures, open reduction after a thorough surgical toilet of the wound and immediate plastering gives very good results; but when the patients come under observation after the infection has settled in the tissues, or where there is extensive mutilation of the soft parts, the amount of toilet necessary for immediate plastering becomes impossible. In them it is imperative to keep the wounds open for purposes of free drainage of the infection and management of the wound. Winnett Orr's method can be used successfully in certain types of infected fractures, but there still remains a group of cases where any attempt to practice this method will cause the infection to continue and spread along the tissues, considerably jeopardizing the life and the safety of the limb of the patient. In these cases where immediate plastering is impossible one has to depend on continuous traction and proper splinting for their management.

I have found Thomas' bed knee splint bent at the knee to the desired angle admirable in maintaining fixation and giving support. As the presence of infected wounds on the surface

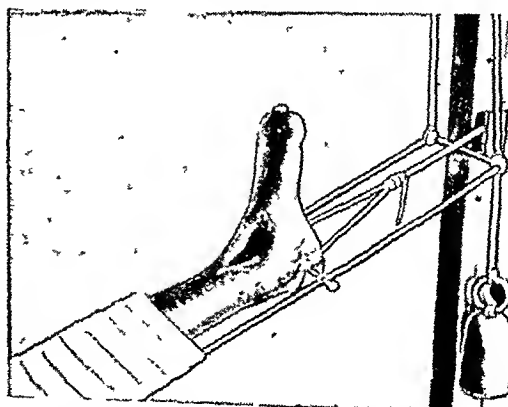


Fig 1—A case of compound fracture of the talus being treated by skeletal traction with Steinman's pin in position.

of the limb prevents the use of the time-honoured sticking plaster extension, I have used skeletal traction by Steinman's pins driven through the calcaneus (os calcis) with uniformly good results. I have treated six cases of compound fractures of the tibia and fibula, and one case of compound comminuted fracture of the talus (astragalus) by skeletal traction. In all these cases infection was fairly severe and sequestra had to be removed before the wounds finally healed. In the compound comminuted fracture of the talus, after cleaning the wound and removing some of the comminuted pieces, I had to use skeletal traction to keep the ankle free for dressing and to relieve the patient of the most agonizing pain on slightest movement of the joint. The infection was so severe that the whole of the bone was destroyed and had to be removed at a subsequent operation. The relief that the patient got after traction was applied convinced me of the utility of the procedure.

Since the introduction of Kirschner's wire most surgeons have given up the use of Steinman's pins for purposes of skeletal traction. There can be no denying the fact that the size of the Kirschner's wire is a decided advantage. I commenced using the Steinman's pin before Kirschner's set was available in the medical college hospitals and continued its use

helps to approximate them into a position most conducive to their union. This approximation has to be maintained by adjustments of the trough on which the limb rests and by keeping up the traction to the desired degree. It has been impressed in the strongest terms that for the healing of fractures immobilization of the bones is absolutely essential, but how often in practice we find that the maxim is forgotten and our attention is directed mainly to the treatment of the infection of the wound allowing the fractured ends to move at their own will. By the time the infection is sufficiently controlled, we rise from our slumber to find that the bone ends have moved and are nowhere near each other. Our attention should always be directed to the position of the bone ends. Constant vigilance has to be kept up to see that the trough is properly adjusted, pads being placed here and there to prevent the movement of the bone ends. Assiduous care is necessary during dressing, so that the position of the fractured ends are not disturbed.

It is seldom necessary to keep the traction pin in for more than four weeks. By that time sepsis is almost always efficiently controlled, and the bone ends adjusted in their position and held by a mass of granulation tissue with loose bone formation in it. After the pin is taken out plaster casing with a suitable window or a removable plaster casing is used with advantage. In cases of compound fracture of the type that is being discussed in this paper, sequestra of varying sizes according to the nature of the case

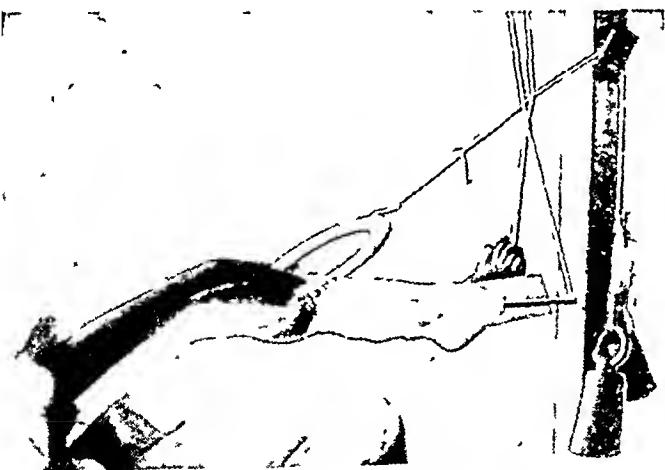


Fig. 2.—A case of compound fracture of the femur being treated by skeletal traction with Kirschner's wire in position.

as I found it fairly satisfactory. Incidentally, I may here mention that I use Kirschner's wire driven through the upper end of the tibia in cases of compound fractures of the femur. Steinman's pin is easy to introduce and does not require a complicated appliance for its introduction.

It cannot be forgotten that skeletal traction is only a means to an end. It serves to keep the strong muscles of the calf under tension and helps to keep the fractured ends of the bones near each other. The relaxation of the muscles is further helped by flexion of the limb at the knee. Once traction serves to bring the ends of the bones near each other, proper manipulation



Fig 3 (a, b and c) showing the condition of the bones at three stages during the treatment of a case of compound fracture of the tibia by skeletal traction. The skiagrams were taken on 26th August, 29th November, and 21st February, respectively.

(Continued at foot of opposite page)

ADMINISTRATION OF OPIUM TO
INFANTS IN INDIABy R. N. CHOPRA, C.I.E., M.A., M.D. (Cantab.)
LIEUTENANT-COLONEL, I.M.S.

and

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Drug Addiction Series No. 16

HABITUAL administration of opium to infants has been prevalent in India for centuries. That this custom was common in the 16th and 17th centuries is evident from some of the passages occurring in 'Ain-i-akbari'. Its use appears to have been started because of its power of allaying diarrhoea and vomiting, relieving cough and pains, such as colic, and producing sleep. Dr. Roberts in the Report of the Royal Commission on Opium (1893-94) stated that administration of opium to infants was common and that it was considered a popular household remedy for their ailments.

(Continued from previous page)

and the severity of infection will have to be removed before complete union takes place.

As in all surgical procedures this method of applying traction has its admirers as well as opponents. Wardle (1933) in his article on fractures of both bones of the leg disfavours skeletal traction and is inclined to consider it as an unjustifiable interference. His views provoked criticism and the reply by Broomhead and Roberts (1933) will be read with interest. When I come to compare the results of my cases treated by this and by other methods, I have only admiration for it, not only for the better results obtained but also for the comfort it gives to the patient.

I do not believe in using it indiscriminately, but only in those cases in which the special conditions indicate it, and when other methods have failed.

In my case the pins through the calcaneus did not cause any damage to the bone, not even in the case of compound fracture of the talus where it had to be driven in so close to the septic wound (figure 1). The movements of the ankle joint were fairly maintained in all other cases except the one with fracture of the talus. In that case the resulting immobility of the ankle was not due to the pin but to the infection and fracture requiring removal of the whole bone. In my experience, which is admittedly limited, the advantages of the method far outweigh its seeming disadvantages.

REFERENCES

- Broomhead, R., and Roberts, N. (1933). *Brit. Med. Journ.*, Vol. II, p. 263.
Wardle, E. N. (1933). *Ibid.*, Vol. II, p. 146.

According to this authority, the custom was widely prevalent in the United Provinces, Rajputana, Malabar and in Bombay Presidency. Although this custom has declined of late years, the problem of doping of infants with opium is of considerable importance now in many parts of India and deserves investigation. During our work in the field on opium habit, we have been able to make a general survey of the problem in different parts of India and have made special study of many of its aspects particularly in the Punjab, the Central Provinces and Berar. In this paper we propose to give the result of these observations.

Incidence of the practice

Our enquiries in the field show that the habit of doping infants with opium still prevails in most parts of India. It is started when the infant is a few weeks old and is not carried on, as a rule, beyond the age of two or three years. The incidence of this custom in various provinces of India is briefly as follows:—

Punjab and North-West Frontier Province.

—So far as these provinces are concerned, although the practice was fairly prevalent twenty-five years ago, it appears to have declined considerably during the last 20 years. Even in the central districts of the Punjab, e.g., Ferozepore, Ludhiana and Jullundur, which are populated chiefly by the Sikhs and where the consumption of opium is one of the highest recorded in India, with the exception perhaps of Assam and Calcutta, the doping of infants with opium is comparatively less common now than it was two or three decades ago. The practice, however, is still indulged in all over the province, and there is hardly a town or a village in which a number of these cases cannot be detected at the present time. The practice is more prevalent in the central districts of Lahore, Amritsar, Gujranwala, Gurdaspur and in the rich canal colonies of Lyallpur, Montgomery and Khanewal in Multan district. In Hoshiarpur and Jullundur districts, where poppy cultivation is allowed and the use of unalanced capsules is prevalent, the custom of giving an infusion made from the capsules of poppy to children in the evening is met with although not to any considerable extent.

In the Frontier Province the custom is not so common except among the poor working classes in large towns like Peshawar, Bannu, Mardan and Dera Ghazi Khan, and in the villages on the border of independent tribal territory and Afghanistan.

United Provinces.—The practice of doping infants with opium in these provinces used to be much more extensive in the old days, but recent inquiries show that it has considerably declined, except in large towns and industrial centres like those of Benares, Cawnpur, Allahabad, Mirzapur, Agra, Lucknow and Moradabad. In such

places the drug is chiefly employed by women of the poor classes engaged in factories to keep the infants quiet when the mother goes to work. The habit fortunately is rapidly disappearing from the rural areas throughout these provinces although cases are still to be met with in most of the villages.

Bengal.—This province has a remarkably large urban population especially towards the west where there is a large industrial population. In the area in the neighbourhood of Calcutta, there are large factories manufacturing jute and cotton, and milling rice, while a little further away are the coal fields employing a very large number of workers.

Our enquiries in this area show that the habit of giving opium to infants is quite extensive among the workers in the industrial areas in the districts of Hooghly, Howrah and 24-Parganas. In these areas most of the labourers come from the Central Provinces (Bilaspur district) and they have brought the custom with them and use the drug extensively for administration to infants. In the mining areas the labouring class is mainly derived from the aboriginal tribes (Sonthals and Bhils) who do not themselves take opium, nor do they administer it to their children.

So far as the town of Calcutta itself is concerned, our enquiries go to show that the custom of doping infants is not uncommon among the Sikh taxi-drivers and the low class labourers hailing from Behar and Orissa, and the Central Provinces. In eastern and northern Bengal though the custom existed formerly it has now practically disappeared.

Behar and Orissa.—The custom of doping infants with opium is prevalent in the districts of Gaya, Cuttack, Balasore, Puri, Sambalpur, Hazaribagh, Ranehi and Palamau. This practice was in vogue to some extent in Manbhum district formerly, but has disappeared now as a result of propaganda work carried out by the district touring officers of the excise, education and public health departments.

Rajputana.—In Jaipur, Ajmer-Mewara and Marwar, the custom prevails on a very extensive scale. In most of these states poppy is being cultivated and opium is produced. The drug is not only largely used by the population for its euphoric effects but is also a common household remedy. The custom of doping infants with opium is prevalent among all classes of people over the whole of Rajputana.

Bombay Presidency.—The custom of giving opium to children is not uncommon in the rural areas of this province particularly in the areas adjoining the Central Provinces and Rajputana and Kathiawar. The practice is more prevalent in the industrial areas like those of Bombay, Ahmadabad and Sholapur on account of a large proportion of female labour employed in the factories. In Gujrat and Kathiawar the practice of giving opium to infants is still largely in

vogue amongst the agricultural population, although not on such an extensive scale as in former days.

Madras Presidency.—This custom is practically non-existent in the south, and only few instances could be detected among the Sawa-rashtra community in Madura district and in Malabar. In the northern parts of the presidency, that is in the Northern Circars, Agency district of Ganjam, Vizagapatam and East Godavari, this practice is very prevalent and has attracted the attention of public health and educational authorities who are doing their best to suppress it.

The Central Provinces and Berar.—In the Central Provinces and Berar the custom of giving opium to children is more widely prevalent than in any other part of India. Our enquiries show that the practice is practically universal and prevails among every community both in the rural and urban areas. The custom appears to be a long-established one and was probably introduced by the Mohammedan rulers who hailed from Persia. It has been estimated that 25 per cent of the total opium consumed in this province goes to infants, and the consumption is still higher in the cotton-growing districts where children account for as much as 40 per cent of the total consumption. In cotton-growing areas the women have to work in the fields for long hours and they naturally want their children to remain quiet during their absences from home. It therefore comes about that as many as 75 per cent of the children are doped with the drug. The practice of giving opium to children is practically universal amongst the labouring classes and agriculturists. Members of the poorer classes, such as labourers, artisans and mendicants, are more affected than the educated. The following table gives an idea of the extent of the custom in the Central Provinces and Berar :

TABLE I

Showing the proportions of opium consumed by children and adults in the Central Provinces and Berar during the year 1933

	Percentage of opium consumed by children	Percentage of opium consumed by adults	Percentage of opium consumed for smoking	Percentage for medical purposes
Central Provinces	5	75	15	5
Berar	40	35	15	10
Province as a whole	25	50	20	5

N.B.—The total amount of opium consumed in 1933 was 12,397 seers (24,794 lbs.). This figure is the lowest on record.

Is the custom declining? Even in the Central Provinces and Berar there has been a considerable fall in the opium consumed during the past few years. This is probably due to the fact that the parents have had to reduce the dose for their children, on account of the present economic depression, the fall in wages and unemployment amongst the agricultural classes. During the year 1933 the consumption for the whole of these provinces averaged 12 seers per 10,000 population, as compared with the average consumption of 27 seers thirteen years ago (1920-21). The figures for Berar are still more interesting. Thirteen years ago the average amount of opium consumed per ten thousand of population was as much as 45 seers while during 1933 the amount fell to 9 seers. The doping of infants has also declined along with the consumption by adults, or is it that only the average dose has decreased? Probably both these factors are coming into play.

The factors responsible for this remarkable decrease are partly the tremendous increase in the price of opium and the prevalent economic depression, and partly also the widespread propaganda which is being carried out against its use by medical and public health authorities. In the industrial areas in the Central Provinces this propaganda has taken a practical shape and, in some of the large factories, nurseries have been provided for the working mothers who can leave their babies when they go to work where due care is taken of them. The women are allowed leave at particular hours to go to the nursery and feed their infants. When the disadvantages of giving the drug to the infants are explained, most of the Indian mothers quickly give it up. The belief that it is good for the babies' growth seems to be also rapidly disappearing.

From a general survey of different parts of India we are convinced that, although opium is still given extensively to infants in some of the large industrial centres where women have to do long hours of work in the factory, this custom is decidedly waning and has considerably declined in the rural areas. It has entirely disappeared from many parts of India where it existed before and is rapidly disappearing from the others.

Analytical study of cases of the administration of opium to infants

Age when started.—The practice is begun during the first few weeks of a child's life. Among the series of children examined by us the earliest time to commence administration of the drug was the age of 3 weeks and the latest was three months, but occasionally the doping may be started at a later age when necessity arises.

TABLE II

The starting age in 100 infants studied

Third week and under	Fourth week	Eighth week	Twelfth week	Total
58	32	4	6	100

It will thus be seen that in about 90 per cent of infants the drug was started before the 4th week of their lives and that only in 10 per cent was it started later than this age. In the rural areas the drug appears always to be administered to those infants who are weakly and ailing. Those who have no trouble during this difficult period are rarely given the drug by the labouring classes.

Duration.—When the child attains the age of 2 or 3 years the practice is usually discontinued. Analysis of a series of 100 children examined at random showed that there is no child who gets opium habitually after the age of 3 years.

TABLE III

Duration of the doping period in 100 children examined

Up to 1 month	2 to 6 months	6 to 12 months	12 to 18 months	18 to 24 months	25 to 36 months
2	26	30	18	18	6 = 100

It will be seen that 66 per cent of the infants get opium up to from 6 to 24 months and that none get it beyond 3 years of age. There is, however, no hard and fast rule regarding the age when the doping is definitely stopped. The practice is generally given up when the child begins to play about and can live on ordinary food such as rice, *dāl* and vegetables.

Ætiology.—As we have shown above both in the Central Provinces and the Punjab the main reason for administering the drug is economic, it is given to keep the children quiet and to allow the mother to do her work unhampered. In Berar and certain parts of the Punjab (Simla Hills) custom forbids the child to be taken out and the mothers have to work for long hours. Cases have also been met with when the drug has been given to appease hunger among the poverty-stricken masses and to keep the baby warm in cold weather.

For disease and minor ailments opium is considered as a sovereign household remedy. It is specially given to children during their teething period to allay diarrhoea, peevishness and salivation. There is a deep-rooted belief amongst the parents in many parts that opium acts as a

preventive against cough, cold, diarrhoea and other minor ailments. The palliative properties of the drug in these conditions cannot be denied and the ignorant people consider it a necessity for their children and are quite unconscious of the harm it does. A large number of parents start giving the drug on account of some disease or minor ailment, and its frequent repetition leads to its habitual administration to the children as in the case of adults.

Table IV shows the diseases and ailments for which opium was started in 100 cases examined at random.

TABLE IV

Disease for which administration of opium was started in 100 children selected at random

	Number of cases
1. Cold with sneezing, coughing, watering of the eyes and nose ..	20
2. Boils all over the body (called 'Charu' in the Punjab) ..	7
3. Diarrhoea, particularly infantile diarrhoea with green stools ..	30
4. Teething and other such troubles ..	10
5. Colic and other pains ..	18
6. Sore eyes, pain and watering of the eyes, otitis media with purulent discharge from the ear (opium is believed to dry up the discharge and allay pain) ..	10
7. To cause loss in weight ..	1
8. For polyuria and anuria ..	1
9. For infantile convulsions ..	1
10. As general tonic and euphoric ..	1
TOTAL ..	100

A perusal of table IV will show that in 48 per cent of the infants the drug was given as a cure for abdominal discomfort, diarrhoea, and colic; in 30 per cent for relief of catarrh of respiratory passages and conjunctivitis, and in 10 per cent for troubles associated with dentition. It is interesting to note that only one child was given the drug because of its virtues as a tonic.

Dosage.—The dose is very small in the case of children so that opium worth a pice or two may suffice for a week or even longer. The dose given is often said to be equal in weight to that of a poppy seed. Experience has taught the mothers to keep the dose as small as possible, because infants usually develop tolerance to the drug very slowly.

TABLE V

The dose administered to 100 children selected at random

Daily dose	Number of cases
Up to $\frac{1}{4}$ gr. ..	40
" $\frac{1}{2}$ grs. ..	44
" $2\frac{1}{2}$ " ..	8
" 3 " ..	8
TOTAL ..	100

The dose is usually three-sixteenths to three-eighths of a grain to begin with, and is gradually increased to one and a half grains; we have recorded cases in which a child between 2 and 3 years received as much as three grains daily, but such large doses are rarely given. In all cases the dose has to be gradually increased to obtain the desired effects. We have observed that the parents are likely to increase the dose whenever the child gets an attack of some ailment, such as diarrhoea, cold or cough. Table V shows that in quite a large majority of cases (84 per cent) the dose is kept below $1\frac{1}{2}$ grains a day and that only in about 16 per cent are larger doses given.

Table VI shows the daily dosage according to age in 100 cases investigated.

TABLE VI

Daily dose	Up to 1 month	2 to 6 months	7 to 12 months	13 to 18 months	19 to 24 months	25 to 26 months	Total
$\frac{1}{4}$ gr.	2	16	14	2	6	..	40
$1\frac{1}{2}$ grs.	2	10	12	8	3	4	44
$2\frac{1}{2}$ "	..	..	2	2	4	..	8
3 "	..	..	2	2	2	2	8
	4	26	30	14	20	6	100

Age incidence.—From table VI it will be evident that 56 per cent of the children taking opium were between the ages of 2 to 12 months and 94 per cent were below 2 years. Only 6 per cent were between 2 to 3 years and no child took opium after the third year. It is thus clear that children between the ages of 2 to 24 months are more liable to be doped, probably because this is a critical period of life in India when the child is more likely to suffer from troubles associated with dentition and other disorders associated with the alimentary and respiratory tracts.

The approximate dose with age and the yearly consumption by a child was worked out in a series of cases in Berar and is given in the following table :

TABLE VII

Age in years	Daily dose limits	Approximate average daily dose	APPROXIMATE ANNUAL CONSUMPTION	
			In tolas	In grains
1	$\frac{1}{8}$ to $\frac{1}{4}$ gr.	$\frac{1}{4}$ gr.	1	180
2	$\frac{1}{4}$ to 2 grs.	$1\frac{1}{4}$ grs.	2	360
3	2 to 3 "	1 gr.	2	360

Table VII shows that a child consumes 5 tolas (900 grains) of opium during the total period of its childhood. The annual consumption of opium by children in Berar is estimated to be 40 per cent of the total yearly consumption.

Frequency.—The dose is generally administered twice daily, i.e., in the morning and in the evening. It may be given only once a day to begin with and when the use of the drug is about to be stopped. We have not met cases where the drug has been administered oftener than twice daily.

Modes of administration.—The drug is administered in the form of crude bazar opium. The usual practice is to buy a week's ration at a time and keep it in a small tin box. The size of a pin's head is broken off and is put into the child's mouth and the child is put to the breast. In Bombay Presidency, especially in Gujrat and Kathiawar, small pills are made which are called *bala golis* or children's pills which are commonly sold by quacks. One of these is dissolved in a little water or milk and given to the child. Sometimes the suckling mothers smear their nipples with opium and thus administer it to the infants.

Sex incidence.—In our series of cases there was a preponderance of female over male children 65 per cent as compared with 35 per cent. The reason for this is not clear.

Symptoms and effects.—The majority of the parents are unanimous with regard to the effects produced by the habitual administration of opium upon their children. They state that after the dose the child keeps quiet, smiles, plays and sleeps well. These infants when examined after their usual dose lie quietly sleeping or half sleeping close to the spot where the mother is working. The narcotic effects of the drug generally last from 4 to 6 hours during which period the child remains undisturbed. An important result of the practice is constipation which is, however, desired and encouraged by the parents to save themselves the trouble of cleaning the child frequently. We have seen infants whose bowels were said to move once or twice a week only. In those infants who have daily movement of the bowels the stools were always hard. The general physical condition and health of the majority of these children were poor as is seen by the following analysis:

TABLE VIII

Showing health of 100 children taking opium

Daily dose	Poor	Fair	Good	Total
Up to $\frac{1}{2}$ gr.	16	16	8	40
" $1\frac{1}{2}$ grs.	24	10	10	44
" $2\frac{1}{2}$ "	2	6	2	8
" 3 "	2	6	..	8
	42	38	20	100

It is difficult to say how far this poor state of general health physique is due to opium alone and how far to other causes, viz, insufficient nutritious food, unhygienic surroundings and general lack of care. There is no doubt, however, that, as compared with children under similar circumstances who were not getting the drug, the doped children looked leaner and more unhealthy.

It is difficult to estimate the immediate and remote effects produced by opium on the mental faculties of the children. We are carrying out detailed studies by following these infants into different stages of childhood and boyhood including their school career. During the period when they are receiving the drug they have a peculiar drowsy appearance and are physically less active.

The parents in many places fully believed in the beneficial and wholesome effects of giving opium to their children. This belief they said was based on the accumulated experience of many successive generations who had used the drug. Further, the harmful effects of opium, such as constipation and intoxication, which may be considered as the cause of poor health, are actually regarded by the parents as being beneficial and health-giving. There is no doubt that some of the children did look quite healthy despite the large doses they were receiving but such cases are not common.

Another danger of the use of the drug is that unless the dose is properly regulated there may be accidental poisoning. Doctors and nurses working in the mill dispensaries have often noted children brought in a state of somnolence from an overdose of opium. The toxic syndrome consists in the child being unusually sluggish and drowsy, the pupils contracted, and the reflexes diminished. The symptoms may pass off without any treatment, but deaths from overdose do undoubtedly occur though not frequently. Continued use of the drug appears to make the child more liable to attacks of epidemic diseases. Most of these children are continuously ailing and our inquiries show that the mortality rate among them is comparatively high.

We have observed that children soon get addicted to the drug and develop withdrawal symptoms. If the drug is not given about the due time, the child cries, its eyes and nose water, it does not take its nourishment well, and it gets looseness of the bowels. All these symptoms subside when a dose of opium is given. This rapid disappearance of the symptoms certainly accounts for the deep-rooted belief regarding the beneficial effects of opium in the parents' minds. The question as to whether the children become addicted to the drug in the same way as adults is under investigation and will be dealt with in a separate paper.

Physical effects.—Opium appears to hinder the normal growth of the child probably on account of the toxæmia it produces. The children

are as a rule smaller for their age, are thin, anæmic, and emaciated; their conjunctivæ are dull and their pupils contracted; and they have a general unhealthy appearance. Conjunctivitis, corneal ulcers and opacities, and otitis media with purulent discharge are frequent occurrences among these children. About 40 per cent of the children were found to be suffering from enlarged tonsils, adenoids and discharge from the nose. The tongue is often coated with fur. The abdomen was prominent on account of the sluggishness of the bowels and accumulation of the gut content and production of wind. The liver was enlarged and palpable in 20 per cent of the children and all of them had a relaxed skin on account of the paucity of subcutaneous adipose tissue, and were under weight. The bones were prominent owing to wasting of the overlying muscles. The chest was thin-walled and the ribs were prominent on account of the wasting of the intercostal muscles. The cardiac impulse was forcible, and the heart sounds loud and could often be heard all over the chest.

Strength of the habit.—It does not have the same hold over children as over adults. In most of the children the drug can be stopped without any great inconvenience. Cases have been recorded, however, where a child showed most of the abstinence symptoms occurring in adult addicts.

Seventy per cent of the parents believed that opium was beneficial if administered in proper doses before 3 years. The balance recognized that it was harmful, but considered its use essential to enable them to do their daily work. The habit unlike that in adults is not expensive, and furthermore could be easily discontinued.

Discontinuance of the practice.—The weaning of the child from the opium habit is generally done gradually, and any resumption of it in adult life is entirely disconnected from the habit in childhood. When for want of a dose the child cries or becomes restless a heavy meal of rice or milk stops the discomfort. The period taken for the complete withdrawal of the practice varies from a few weeks to one or two months. When a child is irritable from discontinuance of the drug, two or three minims of tincture of belladonna with two to four grains of potassium bromide are very effective in controlling any untoward symptoms that may arise from abstinence. The child is quietened down at once and may fall asleep.

Summary and conclusions

(1) Habitual administration of opium to infants at certain periods of their life has been prevalent in India for many centuries. The habit appears to have been started because of the drug's power of allaying diarrhoea and vomiting, relieving cough and pain, and producing sleep.

(2) The custom although it is still met with in almost every part of India has greatly declined during the last two or three decades. The drug is however still employed extensively in the industrial areas and in the Central Provinces and Berar. The practice is undoubtedly becoming less and less common in the rural areas. It has entirely disappeared from many parts of India where it existed before and is disappearing from others. The incidence of the custom in different parts of the country has been discussed in detail.

(3) An analytical study of a large number of infants receiving the drug has been made, and various factors, such as age of commencement, duration of administration of the drug, causes leading to the custom, dosage given, methods of administration, and symptoms and effects produced, connected with the custom have been discussed.

(4) The main reason for administering the drug is economic, the drug being given to keep the children quiet so as to allow the mother to carry out her work, whether in the factory or the field, unhampered.

(5) The practice is begun during the first few weeks of the infant's life, the earliest time to commence being 3 weeks and the latest period 3 months. The drug is usually discontinued when the child attains the age of 2 to 3 years, that is when it begins to play about and can live on ordinary food. The dose varies from $\frac{1}{8}$ to 3 grains daily.

(6) The drug affects the child's health adversely and hinders growth. The children receiving opium have an emaciated, unhealthy and toxæmic appearance. They are more liable to catch infections and attacks of epidemic diseases and the mortality rate among them is comparatively high.

(7) Although deaths from overdosage are not frequent they do occur. Non-fatal overdosage is not uncommon.

SELECTED BIBLIOGRAPHY

Excise Administration Report of Central Provinces and Berar (1933).

Report of the Royal Commission on Opium (1893-94).

Report of the Committees appointed in 1927 to enquire into the consumption of opium in Central Provinces and Berar (1928).

Chopra, R. N. (1928). The Present Position of the Opium Habit in India. *Indian Journ. Med. Res.*, Vol. XVI, p. 389.

Chopra, R. N., Chopra, G. S., and Grewal, K. S. (1932). Opium Habit in the Punjab. Part I. *Ibid.*, Vol. XX, p. 545.

Chopra, R. N., and Grewal, K. S. (1927). Opium Habit in India. *Ibid.*, Vol. XV, p. 57.

Chopra, R. N., Grewal, K. S., Chowhan, J. S., and Chopra, G. S. (1930). Addiction to 'Post' (Unalanced Capsules of *Papaver somniferum*) in India. *Ibid.*, Vol. XVII, p. 985.

FACTORS INFLUENCING THE SPREAD OF LEPROUS INFECTION

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IN this paper certain definite hypotheses are set forth. Evidence is brought forward in their support based chiefly upon two grounds: the leprolin test, and careful investigation into the histories of affected families at the Bankura Leprosy Investigation Centre.

Our hypotheses may be summarized as follows:—

1. Most healthy human adults possess (perhaps in varying degree) natural resistance to leprosy.

2. Subliminal infections with *Mycobacterium lepræ* tend to increase resistance to the disease.

3. Resistance to leprosy is lessened by three main factors:—

(a) *The age factor*—in young children resistance to leprosy is lowered.

(b) *The debility factor*—any disease, habit, physiological condition, or anything else which debilitates the patient, lowers the body resistance to leprosy during the period that debility lasts.

(d) *The hyperinfection factor*—the multiplication of Hansen's bacilli in the body beyond a certain amount lowers the resistance to leprosy, even though the patient may otherwise enjoy excellent health.

The leprolin test

If an autoclaved suspension of ground-up leproma, containing large numbers of Hansen's bacilli, is injected into the human skin, certain reactions take place which may be studied clinically and histologically. A standard suspension (Hansen's leprolin) is used and 0.2 c.cm. is injected intradermally.

Clinical appearance.—A weal about 10 millimetres in diameter is raised which disappears in a short time and may be followed by the appearance of an area of slight erythema, wider in diameter than the weal; this also disappears after a day or two. If the reaction is positive, there appears after a period varying from 4 days to 2 or 3 weeks a slightly raised, erythematous area round the point of inoculation. On picking up the affected skin between the finger and thumb an indurated nodule is felt varying in thickness from 3 to 10 millimetres. This induration generally reaches its maximum about the third or fourth week, and then gradually subsides, though it may take several months before it entirely disappears. In some cases necrosis takes place at the centre and a small

pustule appears and discharges, this being followed by more rapid resolution of the nodule.

The indurated nodule described above is caused by Hansen's bacilli, and the reaction is the same whether the suspension injected is first subjected to heat or not. A similar reaction is caused in healthy adults by other acid-fast bacilli such as rat leprosy bacilli, tubercle bacilli or saprophytic acid-fast bacilli. For a reason which will appear later, in carrying out the test we generally use as a control a suspension of rat spleen and liver, taken from a rat inoculated several months previously with *Mycobacterium lepræ muris*. This suspension (rich in Stefansky's bacilli and generally called Stefansky's leprolin) is standardized so that 0.2 c.cm. produces, in a healthy, non-leprous adult, at the end of the third week, an indurated nodule of approximately the same size as is produced by the same amount of Hansen's suspension. The end of the third week is chosen as in many cases the reaction to *Mycobacterium lepræ* suspension (Hansen's leprolin) takes place more slowly than that to the control; but at the end of the third week the former has generally caught up on the latter. The degree of reaction may be conveniently read by picking up the nodule between the finger and thumb and measuring it in millimetres with a pair of sliding calipers (figure 1). The test should always be carried out in the thin skin of the medial side of the arm.



Fig. 1—Measuring leprolin nodule with sliding calipers.

So far we have considered the leprolin reaction in the healthy adult. We shall now study the variations in leprous patients:

1. In patients who have been in contact with infectious leprous patients and have received subliminal infections the reaction to Hansen's leprolin tends to be enhanced, while that to Stefansky's leprolin remains the same. This is true whether or not visible lesions are present.

2. In patients in whom hyperinfection has taken place, i.e., in whom bacilli have multiplied to more than a certain concentration, the

reaction to Hansen's leprolin is less, and in C-2 or C-3 cases no indurated nodule forms. Provided however that the patient is an adult and in good health the control reaction to Stefansky's leprolin is positive as in healthy non-lepers.

3. In young children, especially in the first year of life, the reaction to both Hansen's and Stefansky's leprolin is reduced or negative. An exception to this is sometimes found in children who have had slight contact with a highly infectious case, or more close and prolonged contact with a less infectious case, and have thus acquired subliminal infections; in these children one may find the reaction to Hansen's leprolin stronger than that to Stefansky's.

4. In debilitated patients the reaction to both forms of leprolin is reduced or may be clinically negative. Debility in the sense referred to may be caused by various diseases, dietary deficiency, climatic and many other conditions; even such physiological conditions as pregnancy and lactation must often be included.

5. Any two or all of the three factors which lower resistance may exist together and enhance each other, or they may follow each other successively. Thus a child in contact with a highly infectious mother may on account of the age factor acquire a high infection during its first few months or years. Later, as the child grows older, the hyperinfection factor comes into play and prevents the increase of resistance which would naturally have accompanied elimination of the age factor. For further references to the leprolin test see Chiyuto (1932), Hayashi (1933), and Muir (1933, 1934 and 1934a).

The histological study of the reaction to Hansen's leprolin shows a cellular response very similar in nature to that of lesions already present in the skin. In patients with raised indurated macules containing few or no bacilli but showing dense formation of epithelioid cells and frequent giant cells, the reaction to Hansen's leprolin is always strong. If the leprolin nodule is excised some three weeks after inoculation, sections show the same features as are found in the lesions present in the skin, viz, dense grouping of epithelioid cells, disappearance of the bacilli injected, and numerous giant cells.

In contrast to this we take a C-2 case and, choosing a region of the skin where bacteriological examination fails to show any acid-fast bacilli, inject Hansen's leprolin. Clinically there is no reaction. Sections taken two or three weeks later show either no cellular reaction or only a comparatively loose and mild cellular response causing slight thickening of the capillaries; the injected bacilli have almost all entirely disappeared, having apparently been removed by the lymph flow.

Discussion.—At the beginning of this paper we put forward the hypotheses that resistance to leprosy is present in different degrees in the majority of healthy adults; that this resistance

is enhanced by slight (subliminal) infections, but is diminished by heavy infection, by all conditions of debility and in early childhood. These hypotheses are based primarily upon a careful clinical study of large numbers of leprosy cases, but these are confirmed by the results obtained with the leprolin test.

There appears to be no doubt that the leprolin test gives a reliable indication of the degree of resistance to leprosy. It is strongly positive in cases which all leprosy workers are agreed in regarding as resistant cases, viz, those in whom there are a few limited, indurated, highly anæsthetic lesions, chronic in nature, with few or no acid-fast bacilli and with little or no tendency to increase in size or number. There is much reason to believe that lesions showing a strong, compact epithelioid reaction, often with numerous giant cells, as found in sections both of the natural lesions and of the leprolin nodule, may be rightly regarded as a sign of high systemic resistance to leprosy.

In contrast with this is the strong, healthy, adult leper (C-2 or C-3 type), with a negative leprolin test; cellular response to the injected bacilli is comparatively weak. Similarly in young children and in debilitated persons the cellular response to Hansen's leprolin is low and the bacilli are not rapidly destroyed at the site of inoculation. It is justifiable to consider that these three factors render the system non-resistant to leprosy.

It is well known that conspicuous swollen leprosy lesions often disappear during acute febrile fevers, and in other conditions which produce rapid debility. During convalescence however these lesions reappear in their former sites, generally extended in size and often accompanied by new lesions of similar appearance. The explanation of this phenomenon is that during the period of debility cellular reaction to the bacilli lying in the skin is held in abeyance, though the bacilli, undeterred by tissue response and phagocytosis, multiply rapidly. During convalescence the power of the cells to react is gradually restored, marked cellular response to the bacilli in the skin once more takes place, and hence lesions reappear larger and greater in number.

All authorities on leprosy are in agreement that while conjugal infection from infected wife or husband is comparatively uncommon (given variously as from 2 to 4 per cent), infection of children by leprosy parents is exceedingly common, averaging round about 40 per cent. It is generally found (note cases described below) that, in a family where young children, older children and adults are in contact with an infectious case, the younger children tend to develop a generalized form of the disease, at first inconspicuous, but later showing itself in multiple lesions of the cutaneous or non-resistant type. On the other hand those who have passed their tender years when infectious contact first takes

place tend (if the disease appears at all) to develop fewer lesions, and these are more of the resistant, neural type. These facts corroborate the evidence that the resistance in young children to leprosy infection is lower than that in adults.

Spread of infection.—The practical bearing of our hypotheses on the nature of the spread of leprosy may be made clear by presenting it in diagrammatic form (figures 2 and 3).

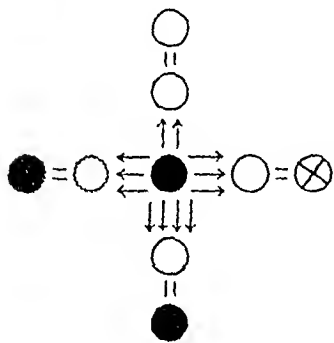


Fig. 2.

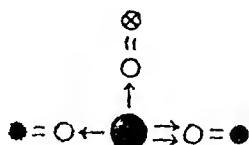


Fig. 3.

The key to the diagrams is as follows:—large disc = adult; small disc = child; white disc = non-leper; crossed disc = non-infectious leper (resistant type); black disc = infectious leper; smooth-margined disc = non-debilitated; wavy-margined disc = debilitated; arrows = degrees of infectious contact; = indicates the result of this infectious contact. Degree of infection depends on the closeness and length of contact and on the grade of infectiousness of the transmitter of infection.

It will thus be seen that, on the basis of the arbitrary standard that we have adopted, two degrees of infection are not sufficient to induce the disease in the healthy adult, but three degrees produce a non-infectious or resistant case, and four degrees an infectious case. On the other hand three degrees of infection are sufficient to make a debilitated adult into an infectious case. In the case of young children, however, one degree of infection may turn a healthy child into a non-infectious case of leprosy, and two degrees a healthy child into an infectious case, while one degree may be sufficient to make a debilitated child into an infectious case.

Leprosy investigation centre evidence

The truth of these hypotheses can only be checked by careful study of the spread of infection in families and communities. Investigations which are being carried out at the Bankura Leprosy Centre furnish considerable confirmatory evidence. The following six charts with explanatory notes illustrate the nature of this evidence.

In the case of healthy individuals the disc of the sex symbol is white, in infectious lepers

black, and in non-infectious lepers crossed. The numbers above each sex symbol indicate (from above downwards) year of birth, year of first clinical signs, year of becoming an infectious case, and year of death. If any of these is not known, a ? is inserted; if any has not yet occurred, a dash is inserted. The century figures are omitted as far as possible to save space, 1920 being written 20. If other families have been infected by the original family the contact is indicated by a dotted line, the year when contact began being marked along this line. When there is more than one case in a family, each case is marked by a serial number in brackets.

CHART I

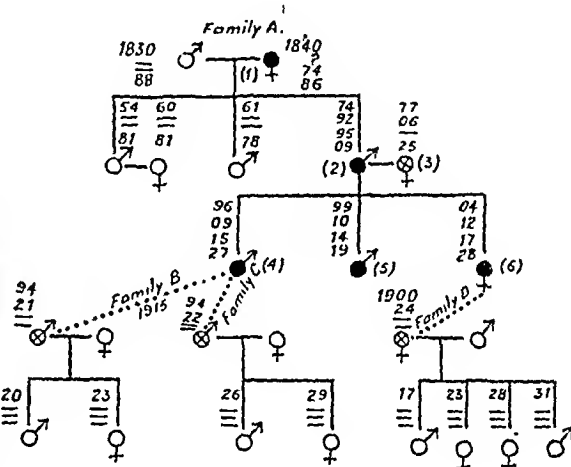


CHART I. Family A.—Gendu (1) when 34 years of age became an infectious case of leprosy after the birth of her third son, Pranannath (2). At that time her first son had married and was living in his father-in-law's house, and her second son was about 13 years old; the latter died in his 17th year without any sign of leprosy. Gendu remained an infectious case for another 12 years and died in her 46th year. Pranannath (2) the third son of Gendu (1) had infectious contact with his mother from birth. He showed his first visible lesion in his 18th year, one year after his marriage. Three years later he became a nodular case and remained in that condition for 14 years, dying in his 35th year. Pranannath's wife (3) was 18 years old when her husband became an infectious case; she developed a few patches in her 29th year, but died in 1925, without further developing the disease, in her 48th year. Jati (4), the first son of Pranannath, was in infectious contact with his father from birth; his first visible lesion appeared when he was 13; he became an infectious case in his 19th year and died at the age of thirty-one. Mati (5), the second son of Pranannath, was likewise in infectious contact with his father from birth. He showed an initial lesion when 11 years old, became infectious in his 15th year and died in his 21st year. Pranannath's third child Gati (6) was a daughter; she also was in infectious contact with her father from birth onwards; her first visible lesion appeared when 13 years old and died as such in 1928 in her 24th year.

Family B.—Paran, a friend of Jati (4) of family A, was in infectious contact with Jati from his 21st year. His first lesion appeared in his 27th year and still persists. He is now 40 years of age and an N-1 case. His wife and two children show no sign of leprosy.

CHART IV. Parimal (1); aged 14, used to play about with cotton swabs from leprous cases, he also used to drink milk supplied by an infectious leprous woman who herself milked the cow; the first sign of disease appeared when he was 4 years old; after repeated attacks of malaria he became an infectious case when 5 years old, and is now a C-3 case at the age of fourteen. His sister (2), aged 11, had infectious contact with her brother from her second year; her first lesion appeared when 10 years old; she is still an N-1 case. Another sister (3), aged 9, also had infectious contact from birth; she first showed signs of leprosy when 8 years old and has now four hypopigmented, anæsthetic patches; she is thus an N-2 case; her leprolin test shows increased resistance to leprosy. Parimal's cousin (4), a boy of five years, had infectious contact from birth; 6 months ago he developed a lesion which is positive on bacteriological examination.

CHART V

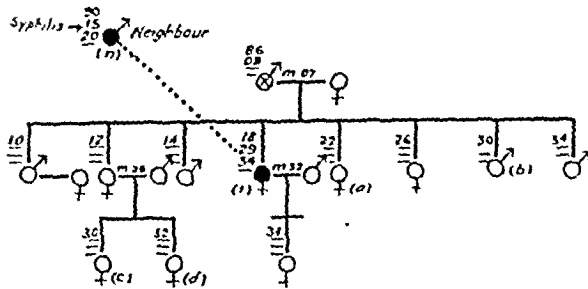


CHART V. A Brahmin, now aged 48 years, noticed about 26 years ago a depigmented anæsthetic patch on his chest. This patch is still present and has during this period undergone no change. It is bacteriologically negative and seems to be a scar. He gives no definite history of contact. His daughter S. B., aged 16, used when a child to be carried about by a neighbour, an infectious case of leprosy, who is still alive and still an infectious case. When she was 11 years old, hypopigmented patches appeared on her body, which however disappeared at puberty. She was married at the age of 14 years 9 months, and 13 months later bore a female child. During this period she was free from any signs of leprosy, but 1½ months after the birth of her child a number of bacteriologically-positive thickened patches suddenly appeared in different parts of the body, including the sites of former lesions. The leprolin test shows slightly increased reaction in the near relatives marked (b), (c) and (d).

CHART VI

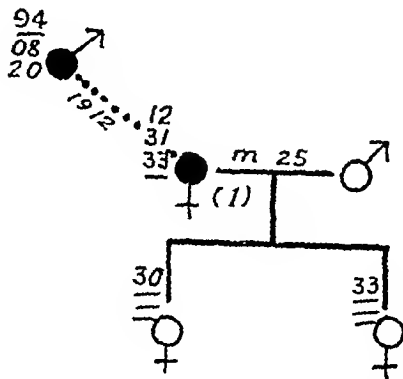


CHART VI. Fulkumari (1) was in contact from her birth up to the age of 3 years with her cousin, an infectious case of leprosy who used to carry her about in his arms. She was married at the age of 13. In her 19th year after the birth of her first daughter, she developed two anæsthetic patches which however disappeared during her second pregnancy. But three months after the birth of her second daughter, many erythematous thickened patches appeared all over her body. She is now 22 years old, a C-1, N-2 case.

We have used the terms 'infectious' and 'non-infectious' for lesions according to whether they were found positive or not on routine bacteriological examination.

Discussion.—We find that, out of the 17 cases which had infectious contact beginning from birth or before the sixth year of life, 10 have already become infectious cases; the average period between their first possible infectious contact and their becoming infectious was 14.7 years. Of the remaining 7 cases one is only 4 years old, and she has already developed

a non-infectious lesion. The remaining 6 are all of one household; one child is already an N-1 and another an N-2 case; in this household the source of infection was a boy who was known to be suffering from leprosy and was kept partly isolated; moreover, in this family the average period between first possible infectious contact and the present time is 5.5 years, or a little more than one-third of the average period required to produce infectiousness in the 10 cases mentioned above which have already reached this stage.

Of the remaining 16 cases, whose first infectious contact occurred at ages varying from 11 to 25 years, only one has become infectious; and there was in his case a very distinct history of marked debility due to malaria and dysentery. Of the 16, however, 8 have developed the non-infectious type of the disease, the period between possible first infection and first appearance of signs averaging 10.5 years.

It will be observed that in no case was there any reason to believe that infection had taken effect through contact with a so-called non-infectious case; this tends to show that this name is a justifiable one for patients who give negative routine bacteriological results.

It is fully realized that the number of family records is too few to form any basis for conclusions. Also, while all members of the families have been included in the survey, only those contacts outside the family who acquired the disease have been included. For the information about some of the cases we had to rely almost entirely upon the results of cross examination of villagers; but, as far as we are aware, no data were entered which were not at least approximately correct. Those 6 families have been selected as typical of many others, and we have recorded them fully in order to show a method of investigation which may usefully be taken up by other workers. As statistics based upon such surveys accumulate the hypotheses put forward will be thoroughly tested.

The present records, as far as they go, tend to confirm our hypotheses, at least regarding the nature of the factors which raise and depress resistance to leprosy.

Two points are brought out clearly by these family records: (a) the importance of the infectious case in transmitting leprosy within the house and among neighbouring contacts; and (b) the importance of the child who within the first few years of life comes into close and prolonged contact with an infectious case. For this child not only acquires the disease, but generally develops it in the cutaneous and infectious form, and thus becomes the transmitter to the next generation. Although adult contacts sometimes become cutaneous or infectious cases, especially if exposed to some severe and lasting source of debility, this occurrence

is comparatively rare; and there is reason to believe that if in any community all infectious cases could be effectively isolated from children under 10 years of age, leprosy would disappear from that community in one, or at most in two, generations.

Summary

1. Most healthy adults are naturally resistant to leprosy. This resistance is increased by small infections, but it is low in young children, and is decreased in debilitated persons and in those who have become hyperinfected with *Mycobacterium lepræ*.

2. Evidence in favour of the above is found in the leprolin test, the use of which is explained.

3. Similarity is found between the clinical and histological appearances of a patient's leprous lesions, and those of the nodule produced by the leprolin test when this test is carried out in the same patient.

4. The factors influencing the spread of leprosy are given in diagrammatic form.

5. The histories of six typical leprous families are examined in detail. These tend to confirm the above hypotheses concerning the spread of infection.

REFERENCES

- Chiyuto, S. (1932). The Leprolin Test. *Philippine Health Service Bull.*, Vol. XII, p. 300.
 Hayashi, F. (1933). Mitsuda's Skin Reaction in Leprosy. *Internat. Journ. Leprosy*, Vol. I, p. 31.
 Muir, E. (1933). The Leprolin Test. *Leprosy in India*, Vol. V, p. 204.
 Muir, E. (1934). Some Factors Influencing the Nature of Leprous Lesions. *Ibid.*, Vol. VI, p. 12.
 Muir, E. (1934a). A Suggested Descriptive Notation of Leprosy Cases. *Ibid.*, Vol. VI, p. 72.

DENTAL MYIASIS

By D. N. ROY, M.D., D.T.M. (Cal.)

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A CASE of dental myiasis in a person with a badly carious tooth was reported by Strickland (1929).

We have now received maggots from a second case, notes of which have been sent by Dr. Chakrabarty, assistant medical officer, Ambootia Tea Estate, Kurseong, as follows:—

'A patient had inflammation of the gum which went on to abscess formation. Pus was noticed round the tooth, the tooth itself not being carious. It was extracted and a large number of fly maggots emerged and were collected. The patient made an uneventful recovery'.

Evidently the odour of pus had attracted a fly which deposited its eggs in the vicinity of the peri-dental abscess while the patient was

(Continued at foot of next column)

A COMPARATIVE RECORD OF ANTHELMINTIC TREATMENT WITH TETRACHLORETHYLENE AND OIL OF CHENOPODIUM

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TETRACHLORETHYLENE has been used as an anthelmintic in the treatment of hookworm infections in various parts of the world since 1925 and a considerable number of papers, some favourable and some adverse, on its efficiency and toxicity have been published by research workers, mainly in the United States of America, since that date.

Articles on its use have appeared in this journal (Maplestone and Chopra, 1933, and Maplestone and Mukerji, 1929 and 1933); in these were embodied the results of researches conducted at the Calcutta School of Tropical Medicine. In the last of these articles a careful résumé of the effects of treatment with tetrachlorethylene was given; the workers concluded that tetrachlorethylene was safer than, and at least as efficient as, carbon tetrachloride.

By the courtesy of the workers at the Calcutta School of Tropical Medicine, I was furnished with a quantity of tetrachlorethylene (Parke, Davis and Co.) in December 1933 and the present paper incorporates the result of treatment carried out since that time in ordinary tea-garden hospital routine on the estates of the Jorehaut Tea Company, Limited. From past experience with carbon tetrachloride the necessity for an equally efficient, but considerably safer type of standard treatment was clearly realized. It was hoped to find this more suitable remedy in tetrachlorethylene.

In spite of all precautions, carbon tetrachloride occasionally produces untoward symptoms, due either to the drug itself, or to one or other of its impurities. In a recent quotation in the *British Medical Journal*, carbon tetrachloride is indicted as the offender and the chemical impurities are exonerated from blame.

One fairly definite fact is that carbon tetrachloride is apt to produce symptoms of toxæmia in cases of severe roundworm infection. Its use in alcoholic subjects has also been arraigned and there is a large mass of evidence that this charge is a true bill.

(Continued from previous column)

asleep. The eggs hatched out and the maggots led to the further trouble.

The larvæ were identified as those of a species of chrysomia, probably of *C. bezziana*.

REFERENCE

- Strickland, C. (1929). A Case of Myiasis of a Carious Tooth. *Indian Med. Gaz.*, Vol. LXIV, p. 386.

Tomb and Helmy (1933) express the opinion that carbon tetrachloride is capable, even in therapeutic doses, of causing fatal intoxication, accompanied by acute degeneration of the liver. They also point out that delayed symptoms are due to non-elimination of the drug. In this connection, the method of administration of carbon tetrachloride simultaneously with an effective dose of magnesium sulphate, as advocated by Maplestone, is undoubtedly the safest plan to follow.

In tea-garden practice here, it has always been the rule to exclude alcoholics from treatment, to examine carefully for signs of hepatic disease, and to avoid 'bazar' days or the days following in giving routine treatment with carbon tetrachloride. A careful chemical examination of this drug was also invariably carried out to determine the presence of impurities, notwithstanding the assurances of the makers that their product was wholly reliable. It was hoped to avoid the necessity for these precautions by using tetrachlorethylene.

The number of cases treated in the present series was 300 and this was regarded as a sufficiently large number to justify or condemn tetrachlorethylene as a satisfactory anthelmintic for general use on tea gardens. Tetrachlorethylene supplied by Messrs. Parke, Davis and Co. was used at the beginning, and later Merck's preparation of the same drug, as further supplies of the former maker's product were not at the time available.

Chemistry of tetrachlorethylene

The production of tetrachlorethylene and similar organic chlorides is carried out in the following way. Dry and purified HCl gas is compressed and mixed with pure dry CO under a pressure of 1,000–3,000 lbs. per square inch and then treated with a catalyst such as NiO, Al₂O₃, and CuO at a temperature of about 230–400°C.

The resultant, as far as tetrachlorethylene is concerned, is expressed by the formula CCl₂:CCl₂ or C₂Cl₄. It has a density of 1.6558 at 0°C. and 1.6311 at 15°C. B.P. is 121.2°C. and M.P. is 22.35°C.

Zuckermundil recommended that a small proportion of a paraffin hydrocarbon, such as liquid petrolatum, be dissolved in it to inhibit decomposition. The amount suggested is 0.1 to 1 per cent of liquid paraffin. Parke, Davis and Co. recommended that the drug should be put up in red capsules to prevent the action of actinic light.

From a study of the literature of the pharmacology of tetrachlorethylene, it is clear that it should be administered, preferably, after a fat-free diet for twenty-four hours and after combination of the drug with liquid paraffin in the dosage recommended as a stabilizer. The drug should be kept excluded from light and preferably in a brown-tinted bottle.

As the object of the investigation was to test the drug under field conditions little attention was paid to the diet factor, but care was taken to prevent the exposure of the drug to

light, and liquid paraffin was added in the proportions recommended.

With the organic chlorides, it is possible that chlorine atoms may be set free and lead to hypocalcæmia. The inference from this is that calcium gluconate might be a useful addition to the diet of patients under treatment. This was not carried out here, but is worthy of note and would be a rational mode of procedure in cases that exhibited signs of toxæmia. It was not used as no cases of this kind occurred during the trial.

Mode of treatment

Before starting routine treatment on the coolie population, a trial of tetrachlorethylene (hereinafter referred to as TCE) was made on three dogs with a maximum dose of 5 c.cm. for a seventy-pound bulldog. The results were excellent. As regards the symptoms produced, the exhibition of the drug caused a train of events closely resembling complete intoxication. No ill effects ensued and the dogs were perfectly normal in three hours. Symptoms generally ensued about one hour after the dose was given. In these three cases, capsules (Parke, Davis and Co.) were used.

Preliminary series

In treating the labourers on these gardens, the dosage suggested by Maplestone was employed for a preliminary series, 4 c.cm. of TCE along with two ounces of saturated solution of magnesium sulphate being given to adults. The TCE was carefully shaken up with the magnesium sulphate in a four-ounce bottle and given before separation took place. A hundred cases were treated in the preliminary test and no case showed toxic symptoms.

Present series

After this initial trial, which was found to be entirely satisfactory, it was decided to give TCE in different doses, alone and also with oil of chenopodium. For comparison, a separate series of cases were treated with oil of chenopodium alone.

The following four treatments were therefore administered to four groups of labourers:

Group I.—Tetrachlorethylene 4 c.cm. only (TCE/4).

Group II.—Tetrachlorethylene 3 c.cm. only (TCE/3).

Group III.—Tetrachlorethylene 3 c.cm. (TCE/CHEN) plus oil of chenopodium 1 c.cm.

Group IV.—Oil of chenopodium 3 c.cm. only (CHEN).

These were maximum doses for adults. The cases treated were mainly adults and in the children treated proportional doses were used.

No preliminary selection of cases was made, and as far as possible the same type of labourer was treated in each group. In all cases, Tallqvist readings were taken before and after treatment. In order to eliminate the possibility of confusing subsequent symptoms due to the drug with those due to the presence of any inter-current malaria, blood films (thick and thin) were taken prior to the commencement of treatment. Spleen findings were also noted on each case. By these means, it was hoped to avoid errors in compiling the symptomatology of the effects produced by TCE alone.

Symptoms following the administration of TCE

The symptoms produced by 3 c.cm. and 4 c.cm. were similar; the difference in dose did not seem to influence their nature or severity, noticeably. These usually were vertigo, which rapidly subsided, giddiness of about one hour's duration, slight tendency to sweating, which ceased when the patient sat down, and a general feeling of *bien être*. In fact, the symptoms were those of a mild, but not unpleasant, degree of intoxication. In a few cases only, there was transient nausea, immediately following the dose, with occasional complaint of a burning sensation in the throat. These quickly subsided when the patient rested. Very few cases of actual sickness occurred. The symptoms, in the main, were exactly those induced by a hearty jorum of neat raw whisky in the unaccustomed.

In all cases, the labourers preferred TCE to oil of chenopodium as evidently the slight intoxication produced was ranked by them, not as a deficiency, but as a real merit. They manifestly enjoyed the short and pleasant respite from the workaday world. This point is of considerable importance, as any treatment that is effective and at the same time acceptable to the patient is obviously indicated as a routine measure. Several hardened toppers returned after a week and asked for a second helping. With chenopodium, I have never seen this happen, nor has carbon tetrachloride ever enjoyed this salutary popularity.

In no case were there any adverse symptoms and there was no evidence of toxicity either immediately or delayed.

So far as symptomatology goes, TCE is therefore an improvement on carbon tetrachloride, chenopodium, and beta-naphthol.

The following table gives the symptoms produced by each form of treatment with percentages and totals.

Vertigo was common in all the groups including the group treated with oil of chenopodium only. The percentage showing no particular symptoms is fairly even in each series, except that the chenopodium group shows a somewhat higher incidence of negatives. Symptoms of intoxication were common to all the TCE groups but absent in the chenopodium series. The highest percentage of intoxication is in the

TABLE I
Symptoms following treatment

TREATMENT	TCE/4		TCE/3		TCE/CHEN		CHEN		Total	
	Cases	Percentages	Cases	Percentages	Cases	Percentages	Cases	Percentages	Cases	Percentages
No particular complaints.	45	56.25	43	58.11	42	56.76	54	75.0	184	61.33
Vertigo ..	9	11.25	8	10.81	7	9.46	15	20.83	39	13.0
Intoxication ..	10	12.5	4	5.41	4	5.41	..	..	18	6.0
Nausea ..	4	5.0	3	4.05	5	6.76	..	..	12	4.0
Giddiness ..	6	7.5	9	12.16	8	10.81	..	..	23	7.67
Sleepiness ..	4	5.0	..	..	..	..	2	2.78	6	2.0
Vomiting ..	2	2.5	4	5.41	1	1.35	1	1.39	8	2.67
Abdominal pain ..	..	..	2	2.7	2	2.70	..	..	4	1.33
Headache ..	..	..	1	1.25	2	2.70	..	..	3	1.0
Restlessness ..	..	..	..	..	1	1.35	..	..	1	0.33
Perspiration ..	..	..	..	..	1	1.35	..	..	1	0.33
Jaundice ..	..	..	..	..	1	1.25	..	..	1	0.33
TOTALS ..	80	100	74	100	74	100	72	100	300	100

TCE/4 group. Nausea and giddiness were present in a small number of TCE cases, but not in the chenopodium group. Sleepiness was common to the TCE/4 and chenopodium groups only. There were a few cases of vomiting in each series including the chenopodium cases. Abdominal pain occurred in 1.33 per cent of the TCE treatments, but may have been due to intercurrent causes.

In only one case (TCE/3) was jaundice noted. This ensued on the second day after treatment and was transient in character. Previously, in using carbon tetrachloride, I have observed quite a number of cases of jaundice, some of which were of a severe type which necessitated considerable care in treatment.

Mode of checking the results of treatment

In all cases treated, the stool was examined the day before and again ten days after completion of treatment. Egg counts were made of (a) roundworm ova, (b) hookworm ova, and (c) whipworm ova. The presence of any other intestinal parasites was also noted on each case sheet.

Egg counts in all cases were given per cubic centimetre of stool examined. In order to eliminate the personal factor, all counts were carried out by one assistant.

Method of egg count

A suitable test-tube was taken with marks at 17 c.cm. and 20 c.cm. The tube was filled with 0.4 per cent sodium hydrate to the mark 17, and the sample of stool to be tested was added to raise the level to the mark 20 c.cm.

The contents were mixed and placed in a wide-mouthed bottle to which was added another 70 c.cm. of the same solution of NaOH, to bring the total content to 90 c.cm.

Several glass beads were placed in the bottle which after corking was vigorously shaken for five minutes to emulsify the contents completely.

0.15 cubic centimetre of the emulsion was transferred to a slide and a 22 by 40 mm. cover-glass placed over it.

The specimen was then examined microscopically, a no. 3 objective, and a 8×B ocular being used.

All the ova were then counted and the totals of each type were multiplied by 200: this gives the egg count per cubic centimetre of stool examined. If the specimen of emulsion overflowed and spread on to the slide outside the limits of the cover-glass, the excess fluid was also examined and the ova count included in the total in each class.

Equivalence of groups

Parasite rates, spleen rates, and hæmoglobin percentages (Tallqvist) were taken for each case treated. As noted above this was done primarily as a check to obviate the inclusion of symptoms due to another disease appearing in

the symptomatology of TCE, but the data obtained were of value as an index to the homologous character of each group: they are given below :—

TABLE II
Malarial parasite rate

Treatment	No. of cases	POSITIVE FINDINGS		MALIGNANT TERTIAN		BENIGN TERTIAN	
		No.	%	No.	%	No.	%
TCE/4	80	11	13.75	7	8.75	4	5.0
TCE/3	74	9	12.15	6	8.11	3	4.05
TCE/CHEN.	74	9	12.16	8	10.81	1	1.35
CHEN.	72	8	11.11	3	4.17	5	6.94
TOTALS	300	37	12.33	24	8.0	13	4.33

No quartan parasites were found.

Spleen rates.—The average spleen rate of the 300 cases was 14.6, and of each of the groups 1 to 4 it was 14.86, 15.00, 16.22 and 12.50, respectively.

Hæmoglobin (Tallqvist scale).—The average readings of the four groups were, respectively, 61.35, 61.43, 62.16 and 60.41; of the whole 300 cases the average was 61.30.

Other worms found.—Threadworms in considerable numbers occurred in 7 cases in the series. Tapeworms (*Tænia saginata*) were found in two cases only. Threadworms were expelled in two cases treated with TCE/4, in two cases after oil of chenopodium, and in three cases after the mixed treatment. Tapeworms occurred in one case treated with TCE/4 and in one case having mixed treatment.

Condition of worms after treatment

The passing of live worms was reported, as follows :—

TCE/4	..	..	9 cases.
TCE/3	..	..	10 cases.
TCE/CHEN	..	..	7 cases.

No reports were made regarding the cases treated with oil of chenopodium only.

The above results cannot be regarded as entirely conclusive as in a large number of cases no reports were made of the effects on the worms.

Classification of results

The results of treatment in each group were classified in four divisions according to the egg counts. These divisions were as follows :—

1. Completely negative. No ova in samples.
2. Below 600 ova per cubic centimetre of stool. This light degree of hookworm infection is not likely to produce symptoms of anæmia.

3. 600 to 5,000 ova per cubic centimetre of stool. This degree of infection may possibly cause symptoms of anæmia.
4. Above 5,000 ova per cubic centimetre of stool. This degree of infection is almost certain to produce symptoms of anæmia.

[Note.—The above standards are generally accepted as the best for classifying hookworm infections roughly, and are those used by Dr. P. A. Mapstone at the Calcutta School of Tropical Medicine.]

Results obtained

The following table gives the results of each treatment in detail. Cases negative before treatment for any particular worm are excluded from that type in the table.

The same scheme of classification was used for roundworms and whipworms to obtain uniformity in comparison. The part that roundworms play in producing pathogenic symptoms is not so definite as in the case of hookworms, but its ill effects in children have been proven without doubt. It can also cause serious illness in adults when the infection is heavy. As regards anæmia, the part played by roundworm infection is somewhat obscure. Whipworms are generally regarded as non-pathogenic, but they have recently been accused of causing oxaluria. However non-pathogenic it may be, it is certainly better to clear out whipworm infection than to leave them alone. So far no line of treatment has proved effective against the whipworm, probably owing to its choice of position in a sheltered portion of the gut.

No evaluation of other egg infections was made, but the effects of the various treatments on other intestinal parasites are noted in a later section of this paper. The number of such cases was too small to allow of any conclusions on the efficacy of any of the treatments used.

TABLE III

Comparative table showing the results of treatment by four different methods. Number of cases treated in each group and percentage distribution of these cases according to intensity of infection after treatment

	Course of treatment	TCE/4	TCE/3	TCE/CHEN	CHEN
Roundworm	Number of cases in each group.	70	59	57	62
	No ova ..	60.00	44.07	59.65	51.61
	Below 600 ..	15.71	15.25	19.30	11.29
	600 to 5,000 ..	21.43	33.9	17.54	35.49
	Above 5,000 ..	2.86	6.73	3.51	1.61

TABLE III—concl'd.

	Course of treatment	TCE/4	TCE/3	TCE/CHEN	CHEN
Hookworm	Number of cases in each group.	65	58	58	63
	No ova ..	64.61	55.17	68.97	47.60
	Below 600 ..	26.16	17.24	18.96	23.80
	600 to 5,000 ..	9.23	27.59	12.07	28.60
	Above 5,000 ..	..	..	..	..
Whipworm	Number of cases in each group.	75	64	70	65
	No ova ..	41.3	35.94	45.71	33.85
	Below 600 ..	29.3	29.69	37.14	26.15
	600 to 5,000 ..	29.3	34.37	17.15	40.0
	Above 5,000 ..	..	..	..	..

Roundworm.—From the table, it will be evident at a glance that the mixed treatment and TCE/4 produce a high percentage of complete cures, the mixed giving 59.65 and the TCE/4 60.00. The other two types of treatment give a considerably lower percentage of cures.

Hookworm.—The percentages of negative results are again high for the mixed and TCE/4 treatments, and lower for the other two treatments.

Whipworm.—The results are more even and, although there is a slight advantage in favour of mixed treatment and TCE/4, the difference is much smaller than in the other infections. Whipworm is believed to be non-pathogenic and, on this account, and, in view of the small difference in the means, it is not proposed to investigate this group further.

Further consideration of the results

In noting the results it must be borne in mind that the mere percentages of cure do not indicate the extent of the original infections in each patient. These vary within very wide limits and, in order to indicate clearly which type of treatment is statistically the best, some methods of comparison which takes into account the extent of the infection per cubic centimetre of stool before and after treatment must be applied.

The 't' statistical method of Fisher (1932) was therefore applied to the results and the 't' values determined for hookworm and roundworm.

Hookworm.—The very small infections were not included; the series was determined for all egg counts above 3 and under 25 per 0.005 cubic centimetre of stool. The limit 24 was chosen so as to get representative groups under each treatment. 0.005 cubic centimetre of stool was taken instead of 1 cubic centimetre so as to reduce the amount of arithmetic by using the common divisor, 200.

The results obtained are expressed in the following tables :

TABLE IV
Hookworm eggs per 0.005 c.cm. of stool

[illegible]

TABLE V

Hookworm. After-treatment infections in cases with initial infections over 3 and under 25 ova per 0.005 c.cm. of stool

		Ova	Cases	Mean
(a)	TCE/3	56	26	2.151
(b)	CHEN	91	41	2.220
(c)	TCE/CHEN	31	29	1.069
(d)	TCE/4	38	35	1.086

TABLE VI

Table of comparisons

(a) and (c)	(a) and (d)	(b) and (c)	(b) and (d)
S = 2.40	S = 2.231	S = 2.62	S = 2.482
t = 1.67	t = 1.51	t = 1.81	t = 1.98
P = 0.11	P = 0.141	P = 0.078	P = 0.051
Odds on = 9-1	Odds on = 7-1	Odds on = 13-1	Odds on = 19-1

The odds on significance being 20-1, therefore :—

Four c.cm. tetrachlorethylene is nearly significantly better than chenopodium 3 c.cm.

Mixed treatment is better than chenopodium 3 c.cm. alone.

Mixed treatment is almost possibly better than tetrachlorethylene 3 c.cm.

Four c.cm. tetrachlorethylene is not definitely better than 3 c.cm. tetrachlorethylene.

Mixed treatment and 4 c.cm. of tetrachlorethylene are almost equally efficient.

Roundworm.—The same procedure was followed but the count included all cases with egg count of 4 per 0.005 c.cm. of stool and over. The roundworm infections were much greater than the hookworm and the numbers are more evenly distributed so that no upper limit was necessary.

The results* were as follows :—

TABLE VII

Roundworm. After-treatment infections in cases with initial infections above 3 ova per 0.005 c.cm. of stool

		Ova	Cases	Mean
(a)	TCE/3	391	40	9.775
(b)	TCE/CHEN	183	41	4.463
(c)	TCE/4	180	42	4.285
(d)	CHEN	196	49	4.000

TABLE VIII

Table of comparisons

(a) and (b)	(a) and (c)	(a) and (d)	(b) and (d)	(c) and (d)
S = 11.64	S = 10.9	S = 10.5	S = 7.96	S = 6.99
t = 2.05	t = 2.26	t = 2.58	t = 0.34	t = 0.24
P = 0.050	P = 0.034	P = 0.016	P = ...	P = ...
Odds on = 20-1	Odds on = 29-1	Odds on = 62-1		

[* It has been necessary in the interest of space to omit the table for roundworms which corresponds to table IV.—Editor, I. M. G.]

The odds on significance being 20-1 or over, therefore :—

Mixed treatment is significantly better than tetrachlorethylene 3 c.cm.

Tetrachlorethylene 4 c.cm. is significantly better than tetrachlorethylene 3 c.cm.

Chenopodium 3 c.cm. is very significantly better than tetrachlorethylene 3 c.cm.

Mixed treatment and chenopodium 3 c.cm. are about the same value.

Tetrachlorethylene 4 c.cm. and chenopodium 3 c.cm. are about the same value.

Discussion

A method of comparison which would include all the results is not demonstrated in any of the standard works on statistics, and the method chosen, using Fisher's 't', is the best available at the moment. It is hoped that a better method may be evolved in the near future when a résumé of the comparisons may be given in a future paper.

The fallacy of accepting conclusions on mere percentages is made apparent, and much medical work in the past has no mathematical value as exact methods of comparison have not been used and conclusions have been arrived at which would not bear exact investigation.

In giving these results, much of the tedious working out has been omitted and it is hoped that this omission does not obscure the issue. To include all would render this paper unnecessarily long without adding to its interest for the general reader who is only concerned with the results.

A study of co-variances shows that there is some degree of correlation between initial and final egg counts, but this has not been included in the present paper.

Acknowledgments

I have to acknowledge the valuable assistance of my chief laboratory assistant, Dr. L. R. Dey, who carried out the egg counts, and the help which I received in the statistical section from H. R. Cooper, Esq., B.Sc., F.C.S., Acting Chief Scientific Officer, Tocklai Experimental Station, and from G. Walker, Esq., Deputy Commissioner, Sibesar, who assisted me with some of the tiresome arithmetic.

My thanks are also due to Doctors L. E. Napier and P. A. Maplestone of the Calcutta School of Tropical Medicine, for arranging the supply of the original bottles of carbon tetrachlorethylene and suggesting a field experiment.

Summary and conclusions

(1) Four hundred coolies were treated with four treatments of which three contained tetrachlorethylene; no adverse results were recorded. It is evident that tetrachlorethylene is a safe and reliable anthelmintic for general use, when properly administered.

(2) Tetrachlorethylene in a dose of 4 c.cm. and mixed treatment, tetrachlorethylene 3 c.cm. plus oil of chenopodium 1 c.cm., proved to be definitely the best methods of treatment for mixed helminth infections, and for hookworm infections.

(3) Oil of chenopodium 3 c.cm. proved the best method of treatment of roundworm infections, but was closely followed by mixed treatment and tetrachlorethylene 4 c.cm. All of these three proved very effective, but the smaller dose of tetrachlorethylene was inferior in this capacity.

(4) Tetrachlorethylene is safer to use than carbon tetrachloride, as it was administered to alcoholics without adverse results.

(5) The partiality of the coolie to tetrachlorethylene is emphasized as an important feature in recommending its use on tea estates.

(6) The percentage of cures with mixed treatment (tetrachlorethylene 3 c.cm. and oil of

chenopodium 1 c.cm.) and with 4 c.cm. of tetrachlorethylene was between 60 and 68 per cent after a single treatment.

(7) The necessity for statistical methods in an investigation of this nature is emphasized.

(8) In conclusion, it seems permissible to suggest that a treatment consisting of 4 c.cm. of tetrachlorethylene and 1 c.cm. of oil of chenopodium might prove more effective still; there is every indication that such a dosage could be used with impunity.

REFERENCES

- Fisher, R. A. (1932). *Statistical Methods for Research Workers*. Fourth Edition. Oliver and Boyd, London.
- Maplestone, P. A., and Chopra, R. N. (1933). *Indian Med. Gaz.*, Vol. LXVIII, p. 554.
- Maplestone, P. A., and Mukerji, A. K. (1929). *Ibid.*, Vol. LXIV, p. 424.
- Maplestone, P. A., and Mukerji, A. K. (1933). *Ibid.*, Vol. LXVIII, p. 617.
- Tomb, J. W., and Helmy, M. M. (1933). *Journ. Trop. Med. and Hyg.*, Vol. XXXVI, p. 334.

A Mirror of Hospital Practice

THREE CASES OF SUBCUTANEOUS INTRA-ABDOMINAL INJURY WITH SOME POINTS IN DIAGNOSIS

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My object in publishing this paper is twofold. First of all in order to emphasize the importance of certain early indications for operative interference, as so many of these cases are overlooked until it is too late; and, secondly, because I believe the condition of subcutaneous rupture of the intestine to be much more common than is generally supposed. R. P. Rowlands (1923) collected 381 cases, of which 315 were rupture of either the jejunum or ileum. Grant Massie (1923) pointed out that in the majority of cases the contusion is below the umbilicus.

The intestine is most frequently ruptured by blows, kicks and crushes on the abdomen; in many cases the blow is only slight in nature. Serious intra-abdominal mischief may be done by indirect violence such as falls on the buttock (Senn, 1904), or, as in one of my cases, by falls on the back.

Diagnosis

Extreme pain, rigidity and tenderness are present from the outset. There may be no bruising of the abdominal wall and if this sign is present it is apt to lead to a hasty and superficial diagnosis of 'contusion of the abdominal wall'.

Rigidity may be purely local at first but rapidly becomes diffuse, the abdomen becoming distended as the escape of gas occurs or as peritonitis sets in.

Shock.—This may be so severe as to prove rapidly fatal; in many cases, however, it is very slight and evanescent.

Vomiting is almost always present.

Dullness.—Shifting dullness may be present in the flanks but a diagnosis should be possible without this sign.

The pulse rate.—A rising pulse rate is an indication for laparotomy.

Auscultation.—The value of auscultation cannot be overestimated. There are two important signs. Twenty years ago Claybrook (1914) pointed out that, in cases of ruptured intestine following injury, the heart sounds can be heard as distinctly over the abdominal wall as over the cardiac area. This phenomenon is probably due to gas in the peritoneal cavity as the presence of free fluid alone is not enough to produce the sign, *e.g.*, in cases of ruptured ectopic gestation. Claybrook stressed the value of this as an indication for immediate laparotomy. More recently James (1934) has pointed out, in an excellent article, the complete absence of peristaltic sounds on auscultation of the abdomen in cases of perforated bowel. He states that this 'silent abdomen' is present often before diffuse peritonitis is established. The site for auscultation is the left lower quadrant of the abdomen.

Mainly on account of errors in diagnosis; the 'missed case' and consequent delay in operation

(for this is the only line of treatment) the mortality of subcutaneous abdominal injuries is appalling. Berry and Giuseppi (1908) reporting on 132 cases give the mortality as 80 per cent in those cases who submitted to operation. Cope (1914) gives the operative mortality of a series of cases as 77 per cent; and Grant Massie showed the mortality as 78 per cent. Without operation all cases are fatal. The latest figures of the mortality are unfortunately not available, but I know that the death rate is still too high. In these enlightened days of 'safe surgery' such a state of affairs is indeed distressing. I would, therefore, urge most strongly that all cases of abdominal injury, in which any four of the following signs are present, be submitted to immediate laparotomy.

- (i) Extreme abdominal pain.
- (ii) Tenderness in the abdomen.
- (iii) Rigidity—local or general.
- (iv) Claybrook's sign
- (v) James' 'silent abdomen' } auscultatory signs.
- (vi) Shock.
- (vii) Vomiting.
- (viii) Rising pulse rate—a rate above 90 per minute or a 'thready pulse'.

Case records

Case I.—Ruptured ileum

Mrs. F. A. G., 43 years of age, was standing on a household ladder, hanging curtains, when the ladder slipped and she was thrown to the ground, striking her abdomen on the projecting edge of the ladder. She felt severe pain in the abdomen and she vomited once. Towards evening she called in her family doctor, as her condition was not improving and he ordered her to bed as she 'looked ill'. The following afternoon she was sent to hospital.

On admission the pulse and temperature were normal, but the patient complained of severe pain over the right side of the abdomen. There was extreme tenderness and rigidity over the right rectus abdominis muscle and just below the umbilicus on the right side there was a small bruise. No other signs of injury were noted.

Operation.—A right paramedian incision was made and there was an effusion of blood into the subcutaneous fatty tissue; a large hæmatoma was present in the right rectus muscle and I hesitated in view of this to proceed further with the operation. Fortunately I did so, for on opening the peritoneum there was an escape of gas. A circular perforation about one-eighth of an inch in diameter was found in the ileum about three feet from the ileo-cæcal junction. It was surrounded by plastic material causing it to adhere to the adjacent coil of intestine. The opening was closed in two layers with catgut. No other tears were seen and, as there had been very little escape of fluid into the peritoneal cavity, the abdomen was closed without drainage.

The patient made a complete and uninterrupted recovery, although laparotomy had been delayed for over twenty-four hours, the fortunate adhesion probably saved the woman's life.

Case II.—Ruptured ileum

Sowar, N. M., 19 years of age, was grooming a horse when he received a kick in the abdomen. He was admitted to hospital immediately, complaining of severe pain in the right side of the abdomen. There was no external sign of injury. There was extreme tenderness over the whole abdomen and rigidity on the right side. Some hours later there was a complaint

from the patient that he was unable to pass flatus. Vomiting was almost continuous. The patient slept at intervals.

The next morning his condition gave rise to anxiety and he was transferred to another hospital (over 100 miles away) by motor-ambulance. On arrival he was seen by me and signs of peritonitis were definite. The temperature was 100°F., and the pulse rate 116 per minute. The abdomen was distended, rigid and extremely tender. There was also shifting dullness in the flanks.

Laparotomy was performed thirty hours after the injury. There was seropurulent fluid in the peritoneal cavity. A tear about a quarter of an inch in diameter was found in the anti-mesenteric border of the ileum about one foot from the ileo-cæcal junction; this was closed by means of a purse-string suture. The peritoneal cavity was swabbed out with warm saline and the abdomen closed with drainage. Glucose saline, pituitrin and eserine, and morphia were administered, but the patient died thirty hours later.

Case III.—Ruptured mesentery and branch of superior mesenteric artery

A. S., a Punjabi Sepoy, 25 years of age, was admitted to hospital complaining of pain in the back and abdomen of two days' duration.

He gave the following history. Whilst running down a hill, he slipped and injured his right loin. He vomited once shortly afterwards. No difficulty in micturition and no blood passed in the urine. The pain in the back persisted and there was also pain in the abdomen and inability to sit upright.

Examination.—Sitting posture caused agonizing pain in the abdomen. No bruises were seen on the back and there was no deformity of the spine or pelvis. There was extreme tenderness in the right loin and rigidity of the loin muscles. There was no distension of the abdomen but the whole of the abdominal muscles were rigid. There was board-like rigidity of the lower half of the right rectus muscle and extreme tenderness in the right iliac fossa. Temperature 103°F. Pulse rate—120 per minute. Respiration rate—20 per minute. Urine—normal. Total white cell count—13,800.

Operation.—A right paramedian incision was made and the peritoneal cavity was found to contain blood and clots. Most of this was swabbed away and the terminal part of the ileum at its junction with the cæcum was seen to be of cherry red colour. In the mesentery supplying this loop was a hæmatoma and a small tear. After careful swabbing it was seen that a branch of the superior mesenteric artery was ruptured and spurting. This was under-run with catgut sutures and the small tear was repaired. A lateral anastomosis was performed between the cæcum and the proximal part of the last loop of ileum. No resection was attempted in this difficult region, partly because it was felt that the piece of bowel might recover or at the worst a faecal fistula would form, and partly on account of the critical state of the patient. The abdomen was closed with drainage. A normal motion was passed two days after the operation and recovery was uneventful—the patient being discharged from hospital within one month.

REFERENCES

- Berry, J., and Giuseppi, P. L. (1908). *Lancet*, Vol. II, p. 1143.
- Claybrook, E. B. (1914). *Surg. Gyn. and Obstet.*, Vol. XVIII, p. 105.
- Cope, V. Z. (1914). *Proc. Roy. Soc. Med.*, Vol. VII, Part III (Surg. Sec.), p. 86.
- James, I. T. G. (1934). *Practitioner*, Vol. CXXXII, p. 495.
- Massie, G. (1923). *Lancet*, Vol. II, p. 640.
- Rowlands, R. P. (1923). *Brit. Med. Journ.*, Vol. I, p. 716.
- Senn, E. J. (1904). *Amer. Journ. Med. Sci.*, Vol. CXXXVII, p. 966.

PERI-ANAL ULCERATION COMPLICATING KALA-AZAR

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THE following case is reported as the complication which characterized this case of kala-azar is, we believe, of very rare occurrence.

N. P., a young Hindu male, 25 years of age, was admitted to hospital on 1st May, 1931, suffering with kala-azar. He gave a history of five months' duration of illness; his spleen was about six inches below the costal margin, and the liver slightly enlarged; anaemia was not marked. He had rather a muddy complexion, but was otherwise well nourished. His aldehyde test was positive, and he showed many parasites in his peripheral blood.

Shortly after admission he complained of pain about the anus during defecation, and on examination a small ulcer was seen at the posterior margin of the anus in the middle line. The patient was emphatic that he had no previous lesion there, and that the present one was of recent occurrence. His Wassermann reaction was negative.

Local treatment only was ordered, i.e., dressing with lotio nigra,* application of unguentum hydrargyri ammoniati, and later lotio acriflavina, but despite this treatment the ulceration spread rapidly.

Neostibosan treatment was begun on 8th May, the initial dose given was 0.1 gramme, then 0.2 gramme on 10th May. On the 12th May the patient was in great pain and very restless. It then occurred to the senior writer that the generalized leishmania infection from which the patient was suffering might be the main aetiological factor in producing the ulcer. When first seen the ulcer was small and coated with pus; later it spread rapidly in a fan-shaped manner involving the gluteal folds on either side. The edges were clean-cut and not raised; the base was red, and covered with a thin layer of pus; it did not bleed easily. The surrounding tissue showed no swelling or oedema.

Dr. Napier was asked to see the case as it was such an unusual one. He very kindly did so and agreed that the ulcerative condition could probably be looked upon as a complication of kala-azar, and he suggested intensive treatment with neostibosan, that is, given in full doses of 0.3 gramme every day instead of every other day. He did not think there was need in this case for gold therapy, the routine treatment in cases of cancrum oris*. The patient was treated accordingly and showed improvement within forty-eight hours.

The pain from the ulcer rapidly diminished and by the time his temperature had reached normal the ulcer had almost healed.

Ten days after his temperature was normal, on 28th May, he complained of pain in his right groin and it was then seen that a hubo was developing. This was lanced on 4th June and from the pus a culture of *Staphylococcus aureus* was grown. The wound healed rapidly and the patient was discharged to attend for dressing on 11th June.

The question now arose whether this ulcer was due solely to kala-azar or to some other factor. In the last case of kala-azar complicated with cancrum oris treated by the senior writer, there was a grave suspicion that scurvy was also present and was probably responsible for the precipitation of the ulcerating condition. The

child under consideration was neither ill-nourished nor very anæmic, but all its front teeth were loose and the gums very inflamed. Plenty of vitamin C was therefore given in addition to the routine treatment for cancrum oris. The ulcer healed rapidly, the gums soon closed firmly over the teeth, and the child made a good recovery.

Our patient, N. P., had no complication such as threadworms, piles or syphilis which might have caused proctitis, and have led to secondary anal ulceration. He admitted one previous attack of gonorrhoea and it is possible he might have exposed himself again, so that the possibility that this peri-anal ulceration might have been some venereal manifestation should not be lost sight of. Antimony has been used successfully in the treatment of such conditions as well; but the fact that there was no lesions on the penis or in the inguinal region, and that the ulcer was large, painful and rapidly-spreading is not in favour of such a possibility.

The bubo that occurred was a straightforward one and a pure culture of *S. aureus* was grown from the pus after incision. There was no involvement of any of the other glands.

Cancrum oris is reported to occur in cases of long-standing kala-azar, but in neither of these cases mentioned was the disease of long standing, we therefore suggest that some special factor was responsible for the production of the ulcerating condition in these patients whose resistance was generally lowered by kala-azar. as for instance scurvy in the child and venereal disease in the man.

A CASE OF SCHIZOPHRENIA WITH SUPERIMPOSED BENIGN TERTIAN MALARIA CURED WITH ATEBRIN

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A. C. R., a Bengali Hindu male, aged 33, was admitted into the Carmichael Hospital for Tropical Diseases on 9th March, 1934, in a state of somnolence with a provisional diagnosis of encephalitis lethargica.

The patient had been quite normal mentally and physically until two years ago when, having some suspicion about his wife's character, his mental attitude changed and he temporarily became morose and less communicative. Following a change in his environment, by removing from his village to Calcutta and finding employment in a mercantile firm, his mental condition cleared and he behaved normally for about a year. Shortly after he happened to hear certain remarks of some people about his wife. A severe mental depression overtook him for the second time and he tendered his resignation to the office, which a normal man of his position would never have done. He then went back to his village and became absolutely silent and his movements became limited and short. He had now a short attack of low pyrexia which was regarded as an attack of influenza and soon after he had a short attack of arthralgia of several joints. He then gradually became lethargic, somnolent and passed most of his time in bed. If he was made to sit up he would soon become drowsy. He would often go without food for a fortnight and even then he had to be fed forcibly. He had no inclination to answer the calls of nature. Only very rarely he would get out of

* Krysolgan injections, commencing with a dose of 0.0001 gramme together with some benign mouth-wash, has for sometime been the routine auxiliary treatment for cancrum oris adopted by Dr. Napier.

his bed and roam about his village but he would never talk. In this condition he had been for about ten months until his admission into the hospital.

On examination he was found to be dull and somnolent. His face was expressionless and wore the appearance of 'inanimate stupidity'. Most of the time he would keep his eyes shut but at times he would keep them open for two or three hours at one stretch with a vacant expression. If vigorously aroused he would waken up for a moment or two and then relapse into the same condition. The limbs were flaccid most of the time and became spastic during examination. He appeared to be insensitive to stimuli such as a pin prick, venepuncture, etc. The pupils reacted equally to light; there was no strabismus. The abdominal reflexes were brisk. The Babinski sign was absent. The heart and lungs were normal; the liver and spleen were not palpable. There was a slight degree of anaemia. The Wassermann reaction was negative. After two or three days' stay in hospital it was discovered that he was running a low temperature ranging between 98° and 100°F. This prompted a blood examination for malaria parasites. The smear showed benign tertian rings and trophozoites. There were no microfilaria in the blood. In the stools ascaris and hookworm ova were found; vegetative and cystic *Entamoeba nana* were also present. Bacteriological examination of the stool was negative. The urine was normal.

The patient was put on a five days' course of atabrin. On the second day after atabrin his facial appearance changed for the first time since admission; his dull apathetic expression changed to a slightly cheerful one and he would keep his eyes open for some time. After a course of atabrin the temperature became normal; he could be made to sit up, stand by the side of the bed and gradually walk round the ward with a slow dragging gait. He could now take his meals. He now took some interest in his surroundings and confided that he had domestic worries and physically was very weak. His nervous system was now examined and found to be normal. Evidently he was not a case of encephalitis lethargica.

On the seventh night after admission he suddenly absconded from hospital at about 2 a.m. The following morning he was found at the door of his old mercantile firm where he worked as a clerk a year ago. He explained that he was very much worried about his unemployment and had come to see his superior in the hope of being reinstated to his former post. On being reassured about his post, he was induced to return to hospital. He was then given the combined hookworm and ascaris treatment and he stayed in hospital for about twelve days. He was apyrexial and no longer somnolent. In all his activities he appeared slow and hesitating. He would prefer to sit still without paying much attention to his surroundings. He liked to read books. He seemed to be brooding over something.

The mental condition of the patient can be diagnosed as schizophrenia which explains the symptoms like mental depression, lack of speech and intelligence, lack of response to stimuli, inattention to calls of nature, general immobility, stupor, etc. When the patient actually contracted the benign tertian malarial infection is very difficult to answer. It is probable that the attack of fever which the patient had ten months before admission and which was regarded as an attack of influenza might have been the starting point of malarial infection which had persisted in a very low form for ten months, to be detected only at the hospital after admission. It was equally probable that the infection might have been of recent origin. The most interesting question that arises in connection with the

malarial infection is to what extent, if any, it has added to the clinical picture of the original schizophrenia? Has the lethargic condition or somnolence increased after the malarial infection and if so where is the seat of activity of the malaria parasites? None of these questions could be answered satisfactorily.

The other interesting point about the case is the sudden clearing up of the schizophrenic mental condition after atabrin. The improvement of the mental condition after atabrin leads one to think that probably the malarial infection augmented the schizophrenic condition in such a way that the clinical condition resembled encephalitis lethargica minus its neurological lesions and their complete clinical manifestations. It is possible that the malaria parasites acted deleteriously over the same regions of the brain in the same way as encephalitis lethargica without producing any organic neurological lesion.

The patient has been under observation for about three months after discharge from hospital and during this period his schizophrenic condition has been no worse.

I have to thank Lieut.-Colonel R. Knowles, I.M.S., Director, School of Tropical Medicine, Calcutta, for permission to publish this case.

A CASE OF SARCOMA OF THE UPPER JAW WITH SINUSITIS OF THE ANTRUM OF HIGHMORE

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S., a female child aged 4 years, was admitted on the 25th April of this year on account of a hard bony swelling of the right upper jaw. The mother of the girl stated that the swelling was of four months' duration and rapidly increasing in size.

Condition on admission

The right eye was masked by the swelling and it was difficult to draw the lids apart. The bridge of the nose was deflected towards the left side and the right nostril was blocked. The child could breathe only through the left nostril.

Operation

An opening was made just above the alveolar margin underneath the upper lip on the right side and a little pus was drained through the opening from the antrum of Highmore. This, however, had no effect on the swelling on the face. Accordingly on the 30th March, Moore's operation was undertaken under chloroform anaesthesia. A triangular flap of skin and soft tissues with its apex at the inner end of the eyebrow was made, the bone beneath being freed and laid bare. The excess of bone was chiselled off little by little both from the above and medial aspect. The antrum was cleared of its growth. The flap was then replaced and stitched up. Meanwhile the drainage of the antrum continued through the opening previously made above the alveolar margin. The patient made an uneventful recovery, the operation wound healing by first intention. The swelling subsided, the cosmetic effect was restored and the patient discharged as cured on the 17th May.

Indian Medical Gazette

SEPTEMBER

DIETETICS

SCIENCE, and medical science in particular, is, like many other activities in life, by no means immune to the caprice of fashion. The subject of nutrition and dietetics in this respect is no exception. The wide interest displayed by the public in the subject of dietetics to-day may be due to several influences. In the first place there is on all sides a desire to know more about the attainment of health and the avoidance of disease than hitherto, and it is naturally realized that food must play an important rôle in this respect. In the second place the discovery within recent years of the accessory food substances or vitamins has stirred the imagination not only of the public but also of the medical profession. Here was a substance whose presence—in minute quantities—or whose absence, would condition the normal growth and development of, say, the skeleton. The popular interest in the vitamins is at bottom the same as that which sustains faith in patent medicines or quack cures; they possess the element of the miraculous. This interest is in great measure also due to the extensive research work which is being done in this field all over the world. It is scarcely realized that it would take between two and three hours a day to read all the literature appearing on the subject. Meantime the press and commercial firms re-echo such results as suit their purpose. Scarcely a day elapses but one sees a reference to some extra-potent vitamin extract or preparation. It is not to be denied that they are essential to a complete diet. The main point is that they are receiving undue attention.

At present there are some five accredited vitamins and one of these has been divided into at least four sub-groups while another is threatening to break up into two. To obtain a proper perspective one might do well to look back some sixty years and see what were the nutritional problems of the time and to what extent they have been solved to-day. The practical problems which confronted men like Carl Voit and Rubner were the calorie, and the quantity of protein, fat and carbohydrate in a diet. As regards protein, Voit laid down a standard of 119 grammes (approximately 4 ounces) per diem for a working man. This figure was based simply on what the average Munich labourer was in the habit of consuming. Later workers notably Chittenden in the United States would have this allowance cut down to less than half of Voit's figure. His main contention was that it placed an undue strain on the kidney.

So much for quantity. To-day one can safely recommend a protein intake which lies between that advocated by Voit and Chittenden respectively, although there is no rigid scientific proof in favour of it. The real truth of the matter lies in the fact that the protein problem is one not only of quantity but also of quality. Proteins differ in their capacity to promote growth and maintenance. A protein like gelatin for instance is totally incapable of performing those functions, while the proteins from milk are nature's finest product for the young growing animal. As a result of carefully controlled feeding experiments, a relative figure can now be given to a particular protein which expresses its relative biological value for promoting growth and maintenance. The proteins from flesh and milk have a value of about 100 while those of cereals are low down in the scale, rice being one of the lowest, approximately 30.

The significance of this point is best brought out when it is asked what are the main functions of food in the body; they are to supply energy in the form of calories and materials for growth and repair, as protein. Of all the food-stuffs protein alone can answer to both those claims, vitamins to neither. As an illustration of this, an experiment carried out in Scotland some years ago may be cited. Two groups of school children of the same economic class were given an extra ration of food through the school authorities. The experimental group received so much skimmed milk while the control group were given an equivalent amount of calories in the form of biscuit. At the end of the experimental period of four months it was found that the group receiving the milk showed a greater increase in height and weight than the controls. This result can not be attributed to the calorie intake which was equal in each group, nor to the extra vitamins which were negligible. The greater growth must have been due to an increased allowance of a good quality protein in the form of milk.

When it is realized that millions of the rice-eating classes of India have a protein consumption not more, and often less, than that advocated even by Chittenden, that the biological value of rice protein is low, that one or more vitamins may be lacking in their diets, that their physique is poor compared to that of the Northern races of India who consume a better diet, one can appreciate that the providing of an adequate diet to all would involve a wholesale reorganization of agriculture and economics.

The association of the protein intake and physique was pointed out by McKay in Calcutta some twenty years ago. This unsolved aspect of the dietary has tended to fall into the background since then.

Without in any way minimizing the importance of vitamins it will be appreciated that no surfeit of those substances can promote normal

growth and maintenance without the necessary building stones.

It is not sufficiently realized that the assimilation and metabolism of food is an active process on the part of the living organism. It is no mere stoking of the furnaces of the cells with fuel. Pflüger more than seventy years ago never ceased to stress the contention that protein after absorption became an integral part of the living cell, only to be broken down again in its turn and the effete material replaced from without—a continual flux of matter. The function of the vitamins may possibly be that of controlling or directing this flux. Rigid proof may be lacking for Pflüger's idea but it is at least a biological concept infinitely preferable to crude mechanical analogies.

The question has been asked what is the ideal

diet? The answer is—there is no one ideal diet. What is an ideal diet? The answer is—many. It is the unique property of the living organism that it can adapt itself within a certain range of environmental conditions. A change of conditions, as is well known, is stimulating. Variety may well be said to be the key-note of practical dietetics. It ensures that nothing is left out; it stimulates the palate and alters the nutrient medium surrounding the cells. To-day one hears a good deal about a balanced diet, an expression so difficult to define in rigid terms, an abstraction not readily acceptable to the practical man. This aspect however may well be left to look after itself provided the word variety is interpreted and practised on as liberal a basis as possible.

H. E. C. W.

Medical News

CAMPAIGN AGAINST TRACHOMA

THE Executive Committee of the International Organization of the campaign against trachoma held in Paris on the 14th May, 1934, a conference at which the following members of the Committee assisted: MM. Emile de Grosz, President, F. Wibaut, Secretary-General, A. F. MacCallan, M. Marquez, Morax, Park Lewis, Szymansky, Vice-Presidents; Brandes, de Lapersonne, Van der Hoeve, as well as M. Wagenmann, Maziny Bey and MM. Trantas, Marin Amat, Carris and Churchill.

The President made a sympathetic reference to the death of Professor Angelucci. The Secretary-General read his report from which it appears that the financial situation of the organization is very modest in that it has at its disposal about 1,500 Holland florins. The principal source of receipt is the American subvention. The Executive Committee will provide funds to a research worker desirous of investigating the ætiology of trachoma in a laboratory of a country in which this disease is present. A commission composed of MM. Morax, MacCallan and Wibaut was delegated in regard to this matter.

At the conference which will be held in Budapest in the spring of 1935 it is proposed to examine anew the question of the prophylaxis of trachoma. The rapporteurs elected were as follows: MM. Myashita (Japan), MacCallan (Great Britain), Zachert (Poland), Tewfik (Egypt) and Jitta (Holland).

The organization against trachoma held in conjunction with the International Association for the Prophylaxis of Blindness a conference on the 14th May, 1934, presided over by MM. de Lapersonne of Paris and Emile de Grosz of Budapest. The principal subject was trachoma in the Colonies and in the meridional conditions of Europe. The rapporteurs were Maziny Bey (Cairo) and MM. Maggiore (Genes), Lasnet (Algeria), Trantas (Athens), Wibaut (Amsterdam) and Cucnod (Tunis). In addition M. Morax made a statement on the rôle of gonococcus in tropical zones.

QUININE STOCKS OF GOVERNMENT OF INDIA

(From the *British Medical Journal*, 7th July, 1934)

QUESTIONS IN PARLIAMENT

ON 2nd July the Duchess of Atholl asked why the 300,000 lb. of quinine owned by the Government of India were lying idle, for how long had this been the case, and what arrangements were in contemplation for

making this stock of quinine available for those who annually suffered from malaria and could not procure it. Sir Samuel Hoare said that the Government of India habitually maintained a reserve stock of quinine for emergencies. This reserve rose to 300,000 lb. about 1926 and continued at or above that figure until 1932. Measures had since been initiated to reduce it to 150,000 lb., which was regarded as a sufficient reserve. In March 1933, it had been reduced to 282,759 lb. He had no later figure, but the Government of India was doing its best to increase sales. He would ask for a further report with reference to the last part of the question. The Duchess further asked if the recommendation of the Royal Commission on Agriculture in 1928, that the Government of India should control the production, manufacture, and distribution of quinine in the interests of those who suffered from malaria, had been held up since the first Round Table Conference. Sir Samuel Hoare said there was no foundation for this suggestion.

LEAGUE OF NATIONS' SECOND INTERNATIONAL CONFERENCE ON THE STANDARDIZATION OF VITAMINS

THE second International Conference on the Standardization of Vitamins convened by, and held under the auspices of, the Health Organization of the League of Nations was held in London from 12th to 14th June under the chairmanship of Dr. E. Mellanby, Secretary of the Medical Research Council of Great Britain.

The report of the conference recommended provisions for two years for international adoption, standards and units for four vitamins A, B, C, and D, concerned with growth and infection with beri-beri, scurvy, and prevention of rickets respectively. Since certain of the standard preparations recommended for adoption were not available for general use until 1932, the present conference had at its disposal the results of two years' experience with the provisional standards.

As in the 1931 report, standards and units are recommended only for four vitamins, the possibility of adopting standards for vitamins B₂ and E was considered at the present conference. Many hold that insufficiency of vitamin B₂ causes pellagra and that vitamin E is necessary for successful reproduction in both male and female. The conference felt that our present knowledge of these vitamins, and of the pathological results to which their absence gives rise, is still

insufficient to justify the adoption of standards and units.

The standards for vitamins A and C, provisionally adopted in 1931, have been altered. The substitution of more clearly defined and more easily reproducible chemical substances is a useful step forward. As vitamin A, pure carotene has been chosen in the place of the standard preparation of carotene recommended by the previous conference. The vitamin C standard chosen is ascorbic acid, a substance which the work of Szent-Guörgy (Hungary) showed to be identical with vitamin C. No change has been recommended in the case of the vitamin B₁ and D standards. The former has proved highly convenient in practice—of all the standards chosen by the 1931 conference the vitamin B₁ standard has perhaps proved most satisfactory—and a large stock, sufficient to last for many years, is available at the central institution from which the standards are distributed—the National Institute for Medical Research, London. The vitamin D standard remains unaltered. With the proviso that it may be replaced when exhausted (or should it become for any reason unsatisfactory) by crystalline vitamin D in suitable

solution. Large quantities of the standard solution of irradiated ergosterol are available.

The units remain the same in all cases. Where a change has been made in the standard material, the old units have been restated in terms of the newly-adopted substance. The desirability of leaving the original units unaltered is emphasized by the fact that certain of the units recommended by the 1931 conference have been adopted into the pharmacopœias of a number of countries.

Vitamin standards and units are to-day of considerable importance, not only in connection with scientific work but in the commercial field. In all civilized countries one observes the production of vitamin preparations on a large scale, and it is obviously to the advantage of both manufacturer and purchaser to have some method by which the potency of such preparations may be described. Further, the existence of standards and units facilitates control of such preparations by public health authorities who wish to protect the consumer from wasting his money on preparations which are alleged to be rich in vitamins but which are in fact quite otherwise.

Current Topics

Study of the Treatment in Acute Tetanus

By FREDERIC W. TAYLOR, M.D.

(From the *Journal of the American Medical Association*, 24th March, 1934, Vol. 102, p. 895)

THE results obtained from the treatment of active tetanus cases are far from satisfactory. Mortality statistics on this disease vary considerably from different sources but lack any constant variation that would indicate a desirability of one form of therapy over another. The only constant variation in these statistics is found in a comparison of cases with long and with short incubation periods. Calvin and Goldberg found a mortality of 84 per cent when the incubation was less than five days, of 83 per cent when it was from five to ten days, of 37 per cent when it was from ten to fourteen days, and of 25 per cent when it was from fourteen to twenty-one days.

Until the last few years much clinical investigation has been directed toward determining the most efficacious route of administering tetanus antitoxin. Most failures following any advocated method of treatment have been attributed to an insufficient quantity of serum. The result of this reasoning has been a pyramiding of the antitoxin dosage to unbelievable heights, limited only by the amount of serum available.

This specific treatment with tetanus antitoxin regardless of the route of administration or the amount given has been strangely ineffective in bringing about any marked decrease in mortality. This is remarkable, since the prophylactic use of this serum has achieved such brilliant results.

It was with the hope of gaining additional information, which might aid in the treatment of active tetanus, that this study was attempted.

The material used includes all the cases of active tetanus admitted to the Indianapolis City Hospital and the Indiana University hospitals from 1927 to 1933. These cases were submitted to a critical examination in an attempt to analyse the treatment given and the results obtained. Certain fallacies in the treatment will be pointed out and suggestions made of improvements that might well be instituted.

The patients were quite representative of those applying to a general hospital for treatment after the onset of tetanic symptoms. Their ages ranged from 4 to 63, with 59.4 per cent between the ages of 5 and 15. During the period of our study forty-two patients were treated for tetanus. Of these, five cases were not considered in the study because of a reasonable doubt

as to the correct diagnosis from either a clinical or a laboratory standpoint. The remaining thirty-seven were undoubtedly cases of tetanus. This forms a very small series but, nevertheless, one that suggests several striking deductions.

GENERAL CONSIDERATIONS

Before going further it might be well merely to mention some of the pertinent bacteriologic and physiologic aspects that the disease presents. Tetanus is a symptom and sign complex resulting from the irritant effects of tetanus toxin on the central nervous system. Toxin is elaborated from the focus of infection by the anaerobe *Clostridium tetani*. This organism will not live in healthy, sound tissue but requires either necrotic tissue or tissue that is partially devitalized. Such a devitalization is usually accomplished by the introduction of a foreign body along with the tetanus bacteria. From this focus, usually a deep penetrating wound, toxin is produced. It is believed that the toxin is picked up from the blood stream or the focus by the peripheral nerves or their lymphatics. These structures transport the toxin to the central nervous system. Here it has a particular irritative effect on the cells of the hind-brain and cord. The toxic effects are found in the cells of the lower motor neurons, but to a lesser degree. Once combined with the nerve cell, antitoxic serum cannot displace the toxin. Antitoxin neutralizes only that toxin which is free in the blood or tissues. In this limited neutralization lies its only value in cases of active tetanus.

The nerve cells of the central nervous system are hyperstimulated. These cells and the medullated nerve fibres show slight degenerative changes. However, these degenerative changes are not specific and may be seen in other toxæmias. The damage produced in the nerve cells by tetanus toxin is not permanent and in this feature contrasts with poliomyelitis, in which much of the damage is permanent. The nervous lesions of tetanus apparently are entirely reversible. With recovery, even from the most desperate cases, complete restoration of function is the rule.

Death in these patients results from exhaustion, spasm of the glottis and convulsion but not from the neurologic lesion produced by tetanus toxin. Patients do not die from the disease itself, as in bulbar poliomyelitis, but from its symptoms. The suggestion is made in this connection that if the distributing focus and symptoms are adequately handled the disease will limit itself.

The treatment of active tetanus logically falls into three phases. These are (1) treatment of the local focus, (2) administration of appropriate sedatives and general supportive therapy, and (3) administration of specific antitoxic serum.

LOCAL LESION

Much has been written about the treatment of the local lesion in tetanus. Thorough careful débridement has universally been advocated. Yet, in our experience, this phase has received but little consideration compared with that directed toward the administration of antitoxin. At least, this would seem to be true in the present series. In twenty-three of the thirty-seven cases, adequate exploration was not done on admission to the hospital. In these there were sixteen deaths (69.6 per cent).

It is a frequently noted fact that the local wound in cases of tetanus may appear quite innocent or may be 'healed'. Thus attention is detracted from this initiating cause and directed toward the patient's more active symptoms. Complete local excision of this type of wound has been rightly advocated. There are still prominent texts on the subject which teach that 'if the wound is healed it should not be disturbed'. Just such a procedure was followed in seventeen of our 'healed wound' cases. Of these patients, twelve died, a mortality of 70.5 per cent. It is thought that this disastrous outcome was largely due to negligence in appreciating the local wound as the distributing focus of the toxin and hence the cause of the entire tetanic syndrome.

As pointed out by others, it is astonishing how many foreign bodies are found in these innocent appearing or 'healed' lesions. That these foreign bodies greatly add to the danger of the disease goes without saying. The following examples taken from our cases illustrate this point:

Two of our patients in an extremely critical condition continued a stormy and downhill course after more than a week of the most intense serum therapy. Both cases appeared to be hopeless. Then quite unexpectedly foreign bodies were extruded spontaneously from the draining wounds. In one patient this occurred nearly two weeks after hospital treatment had been instituted. Immediately after the extrusion, convulsions ceased in both patients and they started on a rapid uninterrupted course to recovery.

These cases point out strikingly the importance of a foreign body in the local wound and how it may enhance local production of toxin and bacterial growth. It seems reasonable to assume that in all cases in which the severity of the disease increases with the patient's stay in the hospital there is an inadequately treated focus that is still elaborating tetanus toxin.

In the twenty deaths, only four autopsies were allowed. These are of interest because of the conditions found in the local wounds. Two of the four cases presented wounds that were 'entirely healed'. When, however, these were opened and explored each contained a small foreign body surrounded by necrotic tissue and pus containing *Clostridium tetani*. The wound in the third case was not explored by the pathologist because it was 'completely healed'. In the fourth case a foreign body surrounded by pus and necrotic tissue was removed in the ward the day before the patient reached the autopsy table. This wound likewise yielded tetanus bacilli on culture.

These examples are given to emphasize the importance of the local wound and as an argument against the dictum that 'if the wound is healed it should not be disturbed'. Tetanus is caused by the local focus and continued by it. The local lesion should therefore receive primary consideration. Active tetanus is an acute surgical emergency carrying with it a mortality far in excess of most surgical emergencies. It should be treated as such with admission to the hospital by way of the operating room.

In a discussion of the local wounds, our cases caused by 'blank cartridges' should not be omitted. There were ten of these, resulting in weeping draining wounds of the hands or fingers. It has often been noted that

this type of injury frequently introduces the gun wadding of the cartridge into the wound. The wadding acts as a foreign body, stimulating growth of tetanus bacilli carried in with it. Our cases emphasize this observation. Of the ten cases, eight were searched for gun wadding. In all eight cardboard wadding was found and removed. In the other two a search was not made and both patients died.

No comment is necessary to the foregoing except perhaps the observation that all blank cartridge wounds contain gun wadding, which should be removed.

It would seem from this discussion that the most logical treatment of the local wound in cases of active tetanus is that used by Tulloch. He advocated the complete excision of the focus without entering infected tissue. At many sites, of course, this is not feasible. Here the only alternative is ample wide exploration under general anaesthesia, with a careful search for debris and foreign bodies.

Opinions differ as to the relative merits of the various dressings or irrigating solutions that have been recommended. Tulloch doubts the value of any particular procedure over any other. He also questions the value of oxidizing agents, such as hydrogen dioxide. Since the wound is infected, it is probable that a hypertonic wet dressing best serves the requirements.

SEDATIVES AND GENERAL CARE

It may again be stated that all deaths in tetanus are the results of one or more of the following: convulsions, spasm of the glottis or diaphragm, exhaustion and respiratory failure. It is obvious that therapy directed to prevent these conditions is of prime importance.

In the past, hypnotics, narcotics and general anaesthesia have been used to control these symptoms. Before the advent of tetanus serum, sedatives used and recommended include practically all of those listed in the Pharmacopoeia and need not be mentioned. In mild cases of tetanus many of these are of considerable value. In severe cases all either lack sufficient potency or are too transient in their effect.

The ideal sedative drug should produce a quiet restful narcosis which is well sustained for a number of hours. Its physiologic effect must not be exhausting on the patient after continued use. Drugs very close to this ideal have been used in recent years as basal anaesthetics and have been advocated in controlling tetanic seizures.

Sodium amytal (sodium isoamylethyl barbiturate) has been used in this capacity. Avertin (tribrom-ethanol) has also been used and probably enjoys a greater general popularity.

Both of these drugs are relatively safe and give a well sustained narcosis. In nineteen of our cases, sodium amytal was used intravenously to control symptoms. This was quite efficient and proved far more satisfactory than any other medication. There is one point in this use of sodium amytal which is worthy of note and which likewise applies to tribrom-ethanol. The tendency was to give amytal only when convulsions become severe. The drug was then withheld until convulsions again appeared. A more rational procedure would be to continue sustaining doses, keeping the patient under moderate narcosis at all times. In this way the patient might entirely escape severe tetanic seizures and large amounts of sodium amytal or tribrom-ethanol would not be necessary to restore a restful sleep.

The time-honoured quiet darkened room is of great importance. It is too often either overlooked or not available. That the average tetanus patient is not kept sufficiently relaxed and quiet is well illustrated by our series. Of the twenty patients who died, fifteen (75 per cent) continued to have convulsions or rigidity up to the time of death. Nineteen of the twenty (95 per cent) were restless and not relaxed.

Since the tetanus patient frequently succumbs to exhaustion, all practical supportive therapy must be brought into action. The fluid intake should be maintained at a high level and elimination watched closely. As the patient usually cannot take sustaining amounts

of fluid and nutrition by mouth, these elements must be given by other routes. For this purpose the intravenous and subcutaneous use of dextrose solution and physiologic solution of sodium chloride are of invaluable aid.

ANTITOXIC SERUM

The pedestal on which tetanus serum has been placed in medicine is due entirely to its use as a prophylactic measure. Here it is surpassed by none of the specific serums. Ample proof of this was demonstrated in the World War. Because of these remarkable results, the serum has been viewed with the same faith in the treatment of active tetanus. Here, because of many complex factors, the antiserum fails to duplicate the specific action found in its prophylactic use.

The statement has been made that 'tetanus antitoxic serum has done more harm than good in the treatment of active tetanus'. This at first sounds like rank heresy. However, there is much truth in the fact that this specific has brought about practices that certainly are detrimental to the patient's welfare. Because of the fact that it has been considered a specific, it has been used in general practice to the exclusion of other phases of treatment. The local lesion has been neglected, as well as general supportive measures and sedatives.

The majority of recent writers have expressed the opinion that, in the care of patients who have already shown tetanic symptoms, tetanus serum is of doubtful value. Perhaps the most valuable statistics along this line have been those of Calvin and Goldberg. These writers found no decrease in the mortality rate at Cook County Hospital despite the ever increasing amounts of serum used. Nor could they find any advantage of administration by one route over any other. In spite of adverse evidence as to its value, the average tetanus patient continues to be loaded with massive doses of serum. Failures are still explained on the basis of insufficient serum. Again the local wound and administration of ample sedatives receive little consideration.

In our series twenty patients died, a mortality of 54 per cent. This high rate cannot be explained because of lack of antitoxic serum. The amount given ranged from 50,000 to 420,000 units. Of twenty-three patients receiving from 50,000 to 100,000 units, twelve died (52.1 per cent). Of ten patients receiving from 200,000 to 420,000 units, two died (20 per cent). These figures would seem to indicate strongly the value of massive doses of serum. On further consideration, however, it is clear that those receiving small total amounts lived but a short time after admission to the hospital. Had their span of treatment been longer, they eventually would have received the massive aggregate doses already mentioned. It is because of this fact that statistics indicating the great value of huge doses of serum should not be accepted without further knowledge of their origin.

Our patients received rather uniform initial doses of antitoxin. These consisted in from 20,000 to 60,000 units in 89 per cent of the cases.

Serum was administered by vein, intramuscularly, and beneath the spinal meninges. All three routes were utilized in the majority of cases. In the light of our own results and those of others it would seem that no particular route holds an advantage over any other, except that intravenous and intramuscular medication make the antitoxin immediately available and there is no delay caused by slow absorption. Intravenous administration is somewhat more dangerous than intramuscular medication, because of anaphylactic reactions, and probably no more effective. The intrathecal route would seem theoretically to be more desirable, since the serum causes a non-specific inflammatory reaction about the spinal nerve roots. Experimental evidence demonstrates that this reaction prevents or retards the absorption of toxin from the nerve trunks. Clinically no advantage is noted, and this route has the disadvantage of giving delayed absorption by the circulating blood.

A few of our patients received injections of antitoxin into and about the wound site. While this procedure may prevent the absorption of some toxin, it certainly destroys or interferes with the natural barrier of granulation tissue thrown up about the focus. When local injection is used, the serum should be infiltrated at some distance from the actual lesion where it cannot disturb this barrier. Local antitoxic serum nerve blocks have been advocated and would seem to be of considerable benefit.

As previously stated, serum is of value in neutralizing the uncombined tetanus toxin but can be of no aid in removing that already combined with nervous tissue. Much smaller amounts of serum than those generally used are amply sufficient to neutralize the free toxin of the body. In this light it would seem a more rational procedure to give from 30,000 to 60,000 units of serum when the patient is first seen. This dose might be repeated in a week or so, when a decrease of the amount of antitoxin in the tissues has occurred.

With the consideration of serum as an adjunct and not a 'specific' in the treatment of active tetanus, more attention will be focussed on the local lesion and general care of the patient.

COMMENT

It is hoped that the foregoing has emphasized several phases in the treatment of active tetanus cases not generally appreciated. Treatment should be directed along three well defined lines. These are, in order of their importance, (1) adequate care of the local wound, (2) sedative and general care and (3) tetanus antitoxic serum. Though mentioned separately here, these must be considered as an inseparable triad in the treatment of the disease. If emphasis is to be placed on any particular phase more than on another, I believe that sedatives and the local focus should receive that consideration rather than the use of antitoxin.

1. *Local lesion.*—Since the local wound causes the disease and continues it, prime consideration should be given to that focus. Whenever possible, immediate complete excision of the wound is recommended. When this is not possible, complete exposure and search for foreign bodies should be done under general anesthesia. The foreign body is a potent factor aiding bacterial growth and continuing the elaboration of toxin. It should not be overlooked. In active tetanus cases it must be considered that the local wound contains a foreign body until proved otherwise. This is particularly true of 'blank' cartridge wounds. The local wound of tetanus is an acute surgical emergency and should be treated as such, even though the patient is later admitted to the medical wards.

2. *Sedatives and general care.*—Patients with tetanus die from 'their symptoms and not from the disease itself'. It therefore follows that if these symptoms can be controlled adequately the patient's chance of recovery is much greater. Tribrom-ethanol or sodium amytal is recommended to induce light narcosis. The suggestion is also made that these drugs be given at regular intervals so as to keep the patient quiet and relaxed. This would seem wiser than to use them only when the patient becomes rigid and is on the verge of a convulsion. Equally important in conserving the patient's strength with sedatives is adequate supportive care. Particular attention must be given so that fluid intake is maintained at a high level and proper elimination is effected.

3. *Tetanus antitoxic serum.*—The high reputation that this product enjoys is due entirely to its prophylactic use. Here it is a specific in preventing the disease or at least in lengthening the incubation period. In active tetanus it is in no sense a specific, and its value is questioned by many. As the antitoxin is unable to withdraw toxin already combined with nervous tissue, its sole action is to neutralize uncombined toxin in the body. Here it may have considerable value and, until definite proof to the contrary, its use may well be continued. It seems unnecessary to administer the huge quantities used at present. It is recommended that from 30,000 to 60,000 units be

given when the patient is first seen. This might be repeated if the case runs a long, protracted course. The intramuscular route of injection is perhaps the most satisfactory.

The conclusion of two workers in this field nearly forty years ago is as pertinent to-day as it was then: 'An ounce of clean surgery is worth several pounds of serum therapy'.

Calcium Metabolism in Health and Disease

By FRED A. K. HERBERT, M.A., M.B., B.S.

(From the *Medical Press and Circular*, 3rd January, 1934, Vol. CLXXXVIII, p. 11)

MANY interesting problems arise in the study of the physiological regulation of calcium exchanges in the body. The outstanding physiological requirements are the maintenance of adequate solid deposits of calcium carbonate and calcium phosphate in the bony skeleton, and the maintenance of a constant, or nearly constant, level of calcium in plasma and tissue fluids, so as to secure normal excitability of nerve and muscle. Calcium is also necessary to blood coagulation; but the amount needed for this is very small, and in fact severe calcium deficiency may occur without any interference with normal blood coagulation. The main problems of normal and abnormal calcium metabolism, therefore, concern the mechanisms whereby absorption of calcium, the transport in plasma, the interchange between the plasma and the depots of solid calcium salts in bone, and the excretion by the kidneys and bowel, are regulated in accordance with the needs of the body. The normal balance between deposition and resorption of calcium salts from bone seems to be the main factor in the maintenance of the normal plasma calcium level.

NORMAL CALCIUM METABOLISM

Calcium absorption.—The main sources of calcium in food are milk, cheese, butter, eggs, green vegetables and nuts. Absorption occurs from the upper part of the alimentary tract, and the main factors governing absorption are the acidity of the contents of the upper intestine, the proportions of calcium and phosphorus in the diet, and probably the supply of vitamin D. The change from the acid reaction of the upper intestinal tract to the alkaline reaction in its lower reaches determines the solution and absorption of calcium salts in the upper part, and the precipitation and loss of calcium as phosphate in the lower part of the intestine. The proportion of calcium to phosphorus is important because an excess of phosphorus in the presence of a deficiency of calcium will lead to loss of a large proportion of the calcium as phosphate, and in the same way an excess of calcium will aggravate the ill effects of a deficiency in phosphorus. The proper proportion of the two elements is of more importance than their absolute amounts. The normal adult requires about 0.4 to 0.5 gm. of calcium in the diet; the requirements of children and of pregnant women are greater. A normal varied diet containing adequate amounts of milk will ensure an adequate supply of calcium and phosphorus in their proper proportions. When it is especially desirable to guard against calcium deficiency, as in pregnancy, the supply of both vitamin D and calcium is important. It is generally believed that the vitamin produces its effect by increasing calcium absorption, but there is no direct proof that it acts only or mainly at this stage of calcium metabolism.

Transport of calcium in the blood.—The blood corpuscles contain little or no calcium. The serum contains 9 to 11 mg. Ca per 100 c.c. This is a surprisingly high figure in view of the phosphate and carbonate content of the serum and its slightly alkaline reaction. Two important factors enabling the serum to hold this calcium in solution are the protein content and the CO_2 tension. In any protein solution containing calcium, some of the calcium becomes bound to protein, and the proportion of the total calcium taken up by the protein depends on the nature and amount of the protein and some other factors which will not be discussed

in detail. The protein-bound calcium does not pass through colloidion membranes, and it is therefore possible, by ultrafiltration through such membranes, to determine the proportion of calcium which is protein-bound. In normal serum, on the average, 5.3 mg. Ca per 100 c.c. is diffusible, and 4.7 mg. per 100 c.c. protein-bound. Normally the value for the diffusible calcium of serum is roughly equal to the values for calcium concentration in protein-free tissue fluids (œdema fluids and transudates), and in cerebro-spinal fluid. Now even this figure of about 5 mg. Ca per 100 c.c. in simple solution is much higher than can be explained by the solubility of the calcium salts concerned. Only about 2.5 mg. Ca per 100 c.c. would be expected to exist in ionized form. Some authors have therefore regarded the serum and other body fluids as supersaturated solutions. If this were so, it would be easy to understand the deposition of calcium salts in bone as a precipitation of calcium carbonate and phosphate from a supersaturated solution in the presence of the solid; but how, then, could one explain resorption of calcium salts from bone, or the normal balance between deposition and resorption which maintains the normal calcification of bone and the normal calcium level of serum? The problem of the composition of the diffusible fraction of the serum calcium is still an open question. The general belief is that about 2.5 mg. per 100 c.c. is ionic calcium, and the remainder some non-ionized but diffusible calcium complex of unknown nature. Some believe, on the other hand, that the physico-chemical conditions of serum permit a greater concentration of ionic calcium in serum than in the artificial salt solutions on which calculations of ionic calcium are based. In the absence of any reliable method of measuring ionic calcium directly, the question cannot yet be definitely settled. It is possible that the parathyroid hormone may play a part in increasing the solubility of calcium in serum, but there is no definite evidence that its action in regulating the level of serum calcium is to be explained in this way.

Storage and resorption of calcium in bone.—Little is known of the mechanisms concerned in the interchange of calcium salts between bone and tissue fluid. Wells believed that in calcification of normal bone, and in the formation of pathological calcium deposits, local changes in CO_2 content play a part. In relatively inert material, such as the matrix of bone, the CO_2 tension will be lower than in cellular tissues in which active respiration is going on. Therefore the less cellular areas will be more alkaline, and in these deposition of calcium will be favoured; whereas in areas where the CO_2 tension is higher, the solution of calcium as bicarbonate will be facilitated. There is no doubt that the administration of acids, or of those salts (such as ammonium chloride) which produce a systemic acidosis, leads to the mobilization of calcium from the skeleton.

A very attractive theory of the deposition of calcium salts in bone, developed by Robison, has much experimental evidence to support it. He has found in bone an enzyme capable of liberating inorganic phosphate from the esters of phosphoric acid. The enzyme, phosphatase, is probably present in the osteoblasts. Its action would be to produce a local increase in the concentration of inorganic phosphate which would lead to the precipitation of calcium phosphate in the neighbourhood of the cell.

CALCIUM EXCRETION AND CALCIUM BALANCE

Calcium is excreted both in urine and in faeces. The major part of the calcium lost by the body passes out in the faeces, and of this some is the residue of unabsorbed calcium of the food, and some has been excreted by the large intestine. Some loss by excretion is inevitable even when the diet is very poor in calcium, for the body seems to have no means of conserving calcium when the supply is inadequate. In this the calcium ion differs from the chloride ion. If the chloride in the diet is reduced to a minimum, chloride excretion practically ceases. On the other hand, when diets low in calcium are given, the loss of calcium in urine and faeces continues, and there is a continuously

negative balance. On diets of normal total energy value but containing only 0.10 to 0.15 gm. Ca per day, the total excretion of calcium daily is from about 0.20 to 0.40 gm., and occasionally more. Of this, from 0.10 to 0.16 gm. Ca is lost in the urine, and the remainder in the feces. The results of balance experiments in normal subjects vary very much, and other factors beside the calcium content of the diet affect the retention of calcium, but it is usually considered necessary to have about 0.1 to 0.5 gm. Ca in the diet to ensure that absorption will keep pace with excretion.

PATHOLOGICAL CALCIUM METABOLISM

Tetany.—Cases of tetany fall into two main groups firstly, alkalosis tetany with normal serum calcium values; and, secondly, the various types of tetany associated with low serum calcium. Tetany due to alkalosis may occur (1) as a result of loss of hydrochloric acid from the body by severe vomiting (gastric tetany); (2) as a result of the administration of bicarbonate; and (3) as a result of overbreathing, which causes a deficiency of H_2CO_3 .

In gastric tetany there is a marked fall in the chloride content of the plasma, and a compensatory increase in bicarbonate, causing an abnormally alkaline reaction (pH 7.5 to 7.6 instead of the normal 7.3 to 7.5). After bicarbonate administration an absolute increase in the bicarbonate is the main change, and the plasma chloride shows only a slight fall. In pulmonary over-ventilation the important change is the disturbance of the normal ratio of carbonic acid to bicarbonate as a result of deficiency in CO_2 . There is a slight secondary rise in the plasma chloride.

In all three types of alkalosis tetany, the reaction of the plasma becomes abnormally alkaline. The occurrence of tetany is explained as due to a decrease in the ionized calcium as a result of the increased alkalinity. There is no change in total serum calcium, and no significant change in the diffusible fraction, and in the absence of a reliable method of estimating the ionized calcium, the relationship of calcium to alkalosis tetany lacks experimental proof.

The cases of tetany associated with low serum calcium may be considered under three heads. firstly, tetany due to parathyroid deficiency; secondly, tetany due to nutritional deficiency, and, thirdly, tetany due to phosphate retention. In all types of low calcium tetany both the total and diffusible serum calcium are reduced. The change in the diffusible calcium is probably the primary and significant change. A fall in the diffusible fraction would lead to a secondary change in the protein-bound fraction. It is very rarely that one meets with cases of parathyroid tetany. The importance of preserving the parathyroids in operations on the thyroid gland is well recognized, and post-operative tetany is very rare. Cases of parathyroid deficiency occurring spontaneously have been described, but are extremely rare. In parathyroid tetany there is a fall in the excretion of phosphorus and of calcium, especially affecting the urinary excretion. The serum inorganic phosphorus rises, and the serum calcium falls. There is retention of calcium and phosphorus in the body. In tetany due to nutritional deficiency the conditions are quite different. Infantile and juvenile tetany are always associated with that type of rickets in which the serum calcium is low, and the cause is a dietetic deficiency, probably a deficiency in both calcium and vitamin D. In such cases there is an excess of calcium excretion over calcium absorption, and failure in calcification of the skeleton. Similarly, cases of coeliac disease or idiopathic steatorrhea ('non-tropical sprue') show decalcification of the skeleton, and a low serum calcium associated with tetany. Loss of calcium in the stools in combination with fatty acid as insoluble calcium soap may contribute to the calcium deficiency in these cases of fatty diarrhoea, but probably the main factor causing the calcium deficiency is a failure in absorption of the fat-soluble vitamin D. Such cases may, therefore, be classed with the cases of infantile and juvenile tetany, as due to nutritional deficiency.

The serum phosphorus is low or normal in cases of this type.

It is possible to produce tetany experimentally by injection of phosphate into the circulation. The rise in serum phosphate leads to a fall in serum calcium, probably because the concentrations of calcium and phosphorus cannot both be high at the same time, being limited by the low solubility of calcium phosphate. A similar condition is met with in severe renal disease associated with uræmia. In this condition the serum phosphorus rises, and the serum calcium falls, tetany may occur, and if the condition occurs during the growing period and lasts long enough, bone changes will occur—the changes of renal rickets. The cause of the skeletal changes is not fully understood. There are various therapeutic measures by which a low serum calcium can be raised to the normal with relief of tetany, but their action is different, and the choice of the most suitable measure depends on an understanding of the underlying cause of the tetany. The injection of calcium salts temporarily relieves tetany, but the calcium rapidly disappears from the circulation, and the treatment is only of value as an emergency measure.

The parathyroid hormone raises the serum calcium level, but it produces its effect by mobilization of calcium from the bones. If the tetany is due to parathyroid deficiency, then parathyroid treatment remedies the deficiency, but parathyroid treatment ought not to be used in those cases of nutritional deficiency where the skeleton is already deficient in calcium. Whenever the parathyroid hormone is used serum calcium estimations are necessary in order to avoid overdosage.

The administration of acids, or of salts which cause a systemic acidosis, will relieve the symptoms of tetany, and this relief is due to various causes. In alkalosis tetany, the administration of acid substances will act by correcting the alkalosis. In cases of low calcium tetany, the production of an acidosis will have an immediate effect on the symptoms by increasing the ionized calcium, even before any rise in total calcium occurs. The administration of acids will also raise a low serum calcium to normal, both by increasing calcium absorption and by mobilizing calcium from the skeleton. Owing to the latter effect, acids should be used with caution.

In the cases of nutritional deficiency, treatment is directed to remedying the underlying deficiency by ensuring an adequate diet, by treatment with cod-liver oil or other preparations of vitamin D, or by irradiation. Other methods of raising the serum calcium have their place only as emergency measures.

Hypocalcæmia in renal disease.—The retention of phosphorus and the fall in serum calcium which occur in severe renal failure (azotæmic nephritis) have already been mentioned. In such cases tetany may occur though sometimes the low serum calcium may exist without symptoms of tetany. The presence of acidosis may prevent the development of tetany. Abnormally low serum calcium figures also occur in nephritis with oedema. In these cases the serum proteins are low and consequently there is a fall in the protein-bound fraction of the serum calcium, the diffusible calcium remaining normal. Tetany does not occur under these conditions. The significance of a low serum calcium in nephritis can therefore only be determined when the figures for protein and phosphorus are also taken into consideration.

Hyperparathyroidism.—The effects of parathyroid deficiency have long been known and studied, but only since 1925, when Collip prepared for the first time an active extract of the parathyroid glands, has it been possible to describe the results of excess of this hormone.

The Collip extract, when administered to animals with parathyroid deficiency, will raise the serum calcium to normal, and relieve the symptoms. When administered to normal animals it produces a marked rise in the serum calcium, and symptoms occur which are fatal if the dosage is high enough. The first symptoms of overdosage are lassitude, anorexia,

vomiting and lowered muscular tone. Later the animals become emaciated, and suffer from hæmatemesis and bleeding from the bowel, dehydration, and death from collapse. Post-mortem examination shows hæmorrhage into the gastro-intestinal mucosa, and congestion of the lungs, liver and spleen. Blood analysis in the earlier stages shows an increase in the calcium, and a fall in the inorganic phosphorus, and later a rise in non-protein nitrogen and a rise in inorganic phosphorus. The hormone produces an increased excretion of both calcium and phosphorus in the urine. The source of the excess calcium in blood and urine is the skeleton; the parathyroid hormone causes a mobilization of the calcium from the bones. If animals are treated with doses of parathyroid insufficient to cause severe acute symptoms, and continued over a long period, they develop a generalized osteitis fibrosa similar to the human disease, generalized osteitis fibrosa of von Recklinghausen.

Different species have very different susceptibility to parathyroid overdosage. In man and in the dog there is great susceptibility; the cat is less susceptible, the rodents much less susceptible, especially the rat, which is able to stand very large doses.

At about the same time that Collip introduced his active parathyroid extract, and so began the experimental study of parathyroid overdosage, progress was being made in the study of hyperfunctioning parathyroid tumours in man. It had for some time been recognized that bone diseases, particularly generalized osteitis fibrosa, were associated with enlargement of the parathyroid glands, and the question was debated whether this was due to compensatory hypertrophy or an overfunctioning tumour. In 1925, Mandl attempted to treat a case by parathyroid grafting, and finding that this did harm, he later explored the neck and removed an enlarged parathyroid gland, also removing the grafts he had previously introduced into the abdominal wall. The result was strikingly successful. Since that time many cases have been successfully operated on, and diagnosis has been made easier by the discovery that in these patients there are the biochemical evidences of hyperparathyroidism: the serum shows a high calcium figure and a rather low figure for inorganic phosphorus, and there is a marked excess of calcium in the urine. (Observations on urinary calcium are usually made with the patient on a fixed low calcium diet, and can only be made satisfactorily under conditions which ensure accuracy in dieting, and in collection of excreta.)

The parathyroids in these cases sometimes show hyperplasia, sometimes adenomatous enlargement, but in either case the effect is overfunction.

Removal of the tumour has striking results. The serum calcium falls very rapidly to normal or lower; it may be necessary to give parathyroid extract and calcium gluconate for a short time after operation in order to avoid tetany. The serum phosphorus rises. Excretion of calcium and phosphorus return to normal. The patient loses the pain and tenderness in the bones almost at once; later, gradually the condition of the skeleton improves, both as regards structure and calcification. Cases are on record in which the patient before operation was a helpless, bedridden invalid, and has been walking with a stick six months later. Deformities, of course, remain, but the disease becomes arrested.

Overdosage with irradiated ergosterol.—Therapeutic doses of vitamin D promote calcification of the skeleton, but very large doses cause a quite different syndrome. This toxic syndrome resembles in all respects the effect of overdosage with the parathyroid hormone. The symptoms are the same with both drugs, and the biochemical changes—hypercalcaemia, decalcification of the skeleton and excessive calcium excretion—are the same. Also the different species vary in susceptibility to the toxic effects of irradiated ergosterol in the same way as in the case of parathyroid hormone; those species which are resistant to the one drug are resistant also to the other, and those which

are susceptible to the one are also susceptible to the other. The sensitiveness of a species to the therapeutic use of vitamin D bears no relation to its sensitiveness to the toxic effect, so that one must beware of applying the results of animal experiments to clinical work in considering the possibility of overdosage with vitamin D. Overdosage in the course of therapeutic use of the vitamin must be rare, but it probably occurs occasionally. In view of this relationship between vitamin D and the parathyroid hormone, it is of interest that in fish, which have no parathyroid glands, there are large supplies of vitamin D in the liver.

The use of calcium estimations in diagnosis.—Generally speaking, estimations of the serum calcium are required only in the following conditions: (1) in the investigation of cases of tetany; (2) in the control of treatment with parathyroid hormone; (3) in the diagnosis of generalized osteitis fibrosa with parathyroid tumour.

The changes in serum calcium which occur in renal disease are incidental, and the estimation is not likely to help in the diagnosis or prognosis; moreover, the calcium figures in renal disease can only be interpreted if the figures for protein and inorganic phosphorus are also known. In the majority of cases of rickets the serum calcium is normal; it is low in those cases which are associated with spasmophilia. The serum calcium is normal in all convulsive conditions other than tetany. Beneficial results have been described from the administration of calcium chloride in various conditions associated with effusions. The benefit is probably due to the diuretic effect of the chloride ion, and not to any special effect of calcium in the control of exudation. The serum calcium is normal in urticaria, and in angio-neurotic oedema. It is also normal in cases of 'haemorrhagic diathesis' and of hæmophilia. The amount of calcium required for blood coagulation is very small, and no condition is known in which calcium deficiency causes failure in coagulation. As regards estimations of calcium in urine and faeces, these can only be made satisfactorily under the conditions of a 'metabolism' ward, in which accuracy in dieting and in collection of excreta are assured.

The Modern Treatment of Nasal Catarrh

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THERE are many forms of nasal catarrh which clear up very rapidly with simple forms of treatment. In some of these the best results can be obtained by surgery, in others palliative measures are the best. The history of a case of nasal catarrh is generally of great importance. We can first divide all cases into acute, subacute and chronic.

The acute cases fall into two main groups from the point of view of history. In one the inflammation has produced obstruction to the ostium of the sinus, and an empyema of the sinus has formed. These cases are characterized by pain. It is important to note the presence of previous attacks which show that a case of apparent acute sinusitis is in reality an acute condition grafted on a chronic process.

In the second group of nasal inflammation the ostium of the sinus is open. No pain has therefore been present, and the history given is one of fever and malaise, which have not yielded to the ordinary forms of treatment. Nasal symptoms are often in this class of case slight. In subacute and chronic inflammation we get three forms of history. In the one the patient suffers from intermittent pain; in the second, it is the character of the discharge of which the patient complains; sometimes this is excessive in amount, and sometimes it is slight, but causes a bad taste in the mouth; and in the third, the history is one of general ill-health, which may be manifested by rheumatism, skin disease, and increased bodily or mental fatigue. This last is of considerable importance.

EXAMINATION

Acute cases.—The headache in the early stages is not markedly severe, but as the case progresses it may become agonizing and totally incapacitate the patient from his work. If it is the maxillary antrum which is the site of inflammation this will be dull on transillumination, and the mucous membrane in the middle meatus will be swollen. All practitioners have not, however, the facilities to carry out this examination, but an examination of the fauces gives material information.

In an acute case of sinusitis there can frequently be seen behind the posterior pillar of the fauces a thin white line. This is the main lymphatic from the nose, and, being superficial, is visible through the mucous membrane. The presence of this line gives us the information that examination should be conducted by someone versed in nasal treatment.

In the class of case in which there is no pain, this vessel can still frequently be seen, but sometimes the mucous membrane parallel with the posterior pillar of the fauces is so thickened and congested that it hides the vessel. The presence of this thickening of the mucous membrane is, however, confirmation of the presence of nasal inflammation.

In chronic cases nasal examination shows swelling of the strip of mucous membrane over which the pus is passing. This swelling is seen in the middle meatus if the frontal anterior ethmoidal or maxillary sinuses are the site of inflammation. In cases of sphenoidal or posterior ethmoidal sinusitis the inflammation is most marked on the upper surface of the middle turbinate.

The diagnosis of the actual sinus is, however, more readily made by a post-nasal examination with a mirror. This also shows a thickening of the mucous membrane in the region over which the pus is passing. Thus, if it is the maxillary antrum, the frontal sinus or the anterior ethmoid cells which are the site of inflammation, the mucous membrane is thickened in front of the Eustachian cushion; or if the sphenoidal sinus is the site of inflammation, the pus is passed over the highest and most central portion of the naso-pharynx, and here the mucous membrane is inflamed and thickened.

In the atrophic forms of inflammation these areas of mucous membrane are thickened, but are pallid, and in the hypertrophic states of inflammation they are thick and red. Transillumination may be a guide to show which antrum is inflamed, or if a frontal sinus is the seat of trouble, but will give no information as to the state of any other sinuses. In chronic states it is good practice to obtain a specimen of the nasal pus in doubtful cases, and examine it beneath the microscope. It is important in this examination to determine the character of the cells, and the presence of free micro-organisms.

TREATMENT

Acute cases.—Pain is the symptom which attracts attention when there is obstruction to the opening of an acutely inflamed sinus. In the initial stages the nose should be cocaineized to contract the mucous membrane, and it may be expected that the pain will cease, because the congestion at the opening of the sinus has been removed by the cocaine. The pain will frequently recur, and cocaineization should be carried out again. If by this treatment the pain is gradually lessened, it should be continued up to, but not longer than, a period of three days. If there is no relief from pain, or if the pain on its recurrence is as great as formerly, or if the pain has not ceased after three days' treatment, the sinus should be washed out when this is possible. If it is not possible to catheterize the sinus, the use of cocaine should be continued as long as it causes an improvement. If, however, the symptoms are increasing in severity it will be necessary to consider the need for operative measures.

In the case of the antrum, the bony wall between it and the nasal cavity will be punctured with a trocar, and liquid paraffin used for lavage. Watery solutions should not be used in acute cases, as they sometimes increase the inflammation. The sphenoid and posterior ethmoid sinuses can be washed out through their normal ostia under cocaine anaesthesia. The frontal sinus can often be washed out by introduction of a soft catheter through its normal ostium. In a few cases it is necessary to open the frontal sinus because the catheter cannot be introduced, but this should be deferred in acute cases whenever possible, as cocaine will generally clear up inflammation of the frontal sinus.

As to the use of cocaine, it is necessary to know how much is delivered by the spray that is employed. Certain makers of sprays, for example, Rogers, show the amount upon the spray, but if this is not done it is easy to spray the fluid into a minim measure, and to determine how many emptyings of the ball are necessary before 10 minims have been sprayed. Supposing this number to be forty, the spray delivers 10/40, or one-quarter of a minim, with each closure of the ball. If in this case a 10 per cent solution of cocaine is used, 1/40th of a grain of cocaine would be sprayed with each emptying of the ball.

In certain cases of acute sinusitis there is no pain because the ostium is open. Because these cases are afebrile and painless they are very often missed. The treatment is the same in the early stages; the cocaine generally effects considerable improvement. If the fever and the secretion from the nose continue, and the secretion is for the most part post-nasal, the sinuses can be washed out, or in certain cases filled with liquid paraffin by use of vacuum. The latter is a new method, and under trial in acute cases.

In certain of these cases the fever is maintained, and when this is so it is generally advisable to administer either large quantities of fruit juice or large quantities of sodium bicarbonate, for often when the urine becomes alkaline the temperature falls almost as if by crisis, and inflammation in the nose resolves. In other cases alkalinization does not have this effect, but it does no harm.

Subacute cases.—Many subacute cases of nasal catarrh are very trivial, and are cured spontaneously. There are a few in which treatment is required because the cases have considerable importance. This importance arises by reason of the fact that certain forms of inflammation render the mucous membrane capable of toxic absorption to an unusually high degree, and filter-passing micro-organisms may, in certain rare cases, find their way through the nasal mucous membrane. It is, for example, believed that this is the source of infection in certain cases of encephalitis lethargica.

If in a case of subacute catarrh symptoms such as diplopia, mental unrest, or failure of mental concentration are observed, it may be well to investigate the sinuses. It must be borne in mind, however, that there are many other causes for such symptoms, and many other portals of infection, and that catarrh is very common.

In the rare cases in which the nasal inflammation is the cause of such grave symptoms, lavage of the sinuses with liquid paraffin sometimes works wonders, for the liquid paraffin tends to prevent toxic absorption by covering the surface of the mucous membrane with a layer of oil. In certain cases, even though a nasal sinus may be associated with these symptoms, the lavage of the sinuses with paraffin produces little alteration in the symptoms because the micro-organisms have found their way into the cells of the mucosa.

In a few cases of subacute catarrh we meet with tonsillitis, which is secondary to the nasal inflammation. In such a case the posterior portion of the tonsil is more enlarged than the anterior, and the posterior pillar of the tonsil is much inflamed. In such a case the tonsils should not be enucleated, as the operation may

debase the power of resistance in the sinuses, and lead to an increase in the activity of the infection.

In certain cases of subacute catarrh, particularly when a mild grade of sinusitis is preventing the recovery from a cold, it may be very helpful to try and empty the sinuses by a spray of liquid paraffin, which is actuated by an electric pump. This causes a strong blast of air and paraffin to pass over the opening of the sinus, which causes a vacuum within it in exactly the same manner as the escaping steam causes a vacuum in the inner chamber of the apparatus used for sterilizing dressings. The head is placed in such a position that the partial vacuum will cause the pus to be emptied from the sinus. Sometimes this method works, and sometimes it is useless. If cases of sinusitis fail to clear up completely they should not be left alone, but should be washed out, preferably with liquid paraffin, in order to avoid the damage which otherwise will occur to the mucous membrane in the sinus.

Chronic catarrh.—Many cases of chronic catarrh are trivial; others, by reason of the excess of the secretion, or its taste or odour, call for treatment, while others are more serious in that toxic absorption causes rheumatism, skin disease or similar remote effects. Among these latter there is an important group in which the patient gradually loses mental alertness and efficiency to an extent which is not infrequently prejudicial to his business. The treatment must be designed to fit the case. Thus in a mild catarrh which is not very excessive, and in which the discharge is odourless and tasteless, some simple palliative measures are all that are desired, and generally will bring about a cure.

Of these methods of treatment, a simple nasal douche, which is sniffed from a tumbler up the nose and blown from thence into a basin, is often very helpful. This does not, however, reach the interior of the sinuses, and if a sinusitis complicates the inflammation in the nasal airway, it is desirable to fill the sinuses with oil by the method introduced by Proetz, and called displacement. If the paraffin is mixed with an oil opaque to *x*-rays, such as lipiodol, its entry can be verified from the skiagrams. This gives us the information that the ostium of the sinus is open. If we can fill a sinus in this way oil will be emptied from it by the action of the cilia, and with it the excess of mucus. If the sinus fills again, it probably should be washed out.

There are certain newer methods of displacement which are worth a trial. The *x*-ray photograph, after displacement, may show that one sinus has not filled, and this then may be washed out instrumentally if the discharge continues. In general, however, where is little need to wash out sinuses instrumentally in this mild group of inflammation, as they clear up very well by simple measures. In cases in which the discharge has an offensive taste or smell, or is so excessive as to cause considerable trouble to the patient, it is generally wise to examine the mucus in order to discover the type of cells, and whether free micro-organisms are present in these cells or in the mucus. If free micro-organisms are present it is probable that we shall not operate until other measures have been tried. If there are no free micro-organisms, then the patient must decide whether he will be treated by operative or by palliative measures.

In this class of case the results are obtained more quickly by operative than by palliative measures, and they are generally more sure, but if the patient is content to come week by week for palliative treatment, it will, in cases in which the discharge diminishes progressively, generally effect a cure. Such palliative measures as displacement frequently give good results, but they are tentative, and classified as a test treatment. Frequent washings out of the sinuses by instrumental means can be employed if the patient will permit them, but, generally, patients want some less disagreeable method, and simple displacement followed by nasal douching at home is generally the first choice, and if this fails, an operation is considered.

Before an operation is performed an *x*-ray examination of the sinuses should be carried out. If the *x*-ray shows thickening of the mucous membrane in all the sinuses, it is necessary to consider whether the case is one of allergy or whether the mucous membrane has been thickened as a result of inflammation. This is a very important decision, because allergic cases withstand operation extremely badly. When the sinus mucous membrane is thickened as a result of inflammation, the master sinus, that is to say the one which causes the initial inflammation which has spread to all the other sinuses, shows a greater thickening of its mucous membrane than the others. If the mucous membrane is thickened equally throughout the sinuses, the case is generally one of allergy, and vaccines should be tried. These should be given by the intradermal route, and the degree of reaction of the skin controls the doses, which must be extremely small. In cases in which the thickened mucous membrane is confined to the antrum, and the discharge has not lessened as a result of a reasonable period of treatment, the antrum should be opened by Caldwell-Luc approach, and the mucous membrane carefully removed.

If the frontal sinus shows thickening of the lining mucous membrane, no operation should be carried out unless there has been pain which has not yielded to displacement, but if displacement has failed the sinus can be catheterized or opened. The catheter will generally cause a remission of the symptoms, but will not cure in any but the mildest cases, but it is advisable to give test treatment in these cases before an operation is decided on.

If the inflammation is centred in one sphenoid, or one posterior ethmoid, the lavage can be easily accomplished through the normal ostium, but the opening of the sinus can only be effected by removal of the middle turbinate. If this is diseased, and the lining mucous membrane of the sinuses is seriously affected, operation may give the best results. In the majority of cases instrumental lavage of these sinuses is all that is required, and if there is recurrence it can be easily repeated.

In certain cases the hypertrophy of the mucous membrane, which has been produced by the inflammation, leads to obstruction of the nasal cavity. This obstruction is frequently increased in degree by reason of deflection of the septum. If an examination of the history shows that the nasal airway previous to the inflammation was comfortable, it is probable that removal of the focus of infection will restore the airway. If, in spite of treatment, the airway remains obstructed, the question of straightening of the septum and diminution of the hypertrophied turbinates will have to be considered, but this measure is generally inadvisable as a first procedure.

The only condition in which an operation has invariably to be carried out is that in which the mucous membrane has undergone polypoid degeneration, and when this is the case the altered mucous membrane around the base of the polypi must be removed. In addition, it may be said that the trend of opinion to-day is in favour of conservatism in nasal surgery, and that operation is reserved for those cases which have resisted the various forms of test treatment that are now in vogue.

Dietary and Medical Management of Diseases of the Gall-bladder

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and

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Progress in any field of medicine is not a uniform process. The introduction of new points of view for the study of the disease process, the developments of

new technical methods of examination, or advances in any of the medical sciences may lead to renewed interest, intensive study and rapid progress, at least for a time. The last decade has seen such an interest in the anatomy, physiology, chemistry and pathology of the liver and biliary tract.

It is desirable at the present time, therefore, critically to review this literature and to point out the application of these newer points of view in improving the therapeutic management of the patient with disease of the liver or biliary tract.

Mann has reported, in summarizing both the literature and his own studies, that he has come to consider the gall-bladder as a part of a mechanism whereby the secretory activity of the liver is correlated with that of the gastro-intestinal tract. In the fasting state preceding a meal, the liver is active but the amount of bile secreted is relatively small. The gall-bladder is partially filled with concentrated bile, of which the bile salts are a most important constituent. The sphincter at the end of the common duct allows amounts of bile to escape into the duodenum only at infrequent intervals and most of the bile secreted by the liver passes into the gall-bladder. As soon as the ingested food passes the pylorus the chyme causes the sphincter to relax and, co-ordinately with this, the gall-bladder expels a portion of its contents. The bile salts are quickly absorbed from the intestine and stimulate the liver to increased activity. With the increased secretion of bile there is an increased flow of bile to and from the gall-bladder. With the stomach empty and chyme no longer pouring over the papilla, the sphincter opens less frequently, and gradually the secretory activity of the liver is reduced to that of the fasting state. It therefore appears that the function of the gall-bladder is to provide a reserve of concentrated bile which is of value both in digestion and as a means of stimulating the liver to increased activity at the time the gastro-intestinal tract is most active.

The data on which this hypothesis is based are varied and, in many particulars, still a subject for controversy. The ability of the gall-bladder to concentrate the bile from several to tenfold, suggested by the work of Kemp, Hammarsten and Hohlweg, was conclusively proved by Rous and McMaster and by Mann and Bollman. Whether substances other than water and inorganic salts are absorbed, however, is still under debate. Examination of the gall-bladder of a dog several days after the ligation of the common bile duct shows the surface lymphatics to be distended with bile-stained fluid, while two or three months later the contents of the gall-bladder are reduced to a small amount of inspissated mucus that may fail entirely to give the chemical tests for unchanged bilirubin or bile acids. Mann has reported experiments indicating absorption of bile salts from the gall-bladder, and Andrews and his associates think that such absorption and the consequent ratio of bile salts to cholesterol is an important factor in the deposition of cholesterol crystals from the bile. There would seem, on the one hand, to be some evidence for assuming that the gall-bladder is able to absorb bile salts from the contained bile. On the other hand, the fact that the gall-bladder bile normally contains several times as much bile salts as hepatic bile suggests that such absorption usually is small in extent, at least when compared to the accompanying absorption of water.

The deposition of lipids or, more particularly, cholesterol in the mucous membrane of the gall-bladder noted by Naunyn has been termed the 'strawberry gall-bladder' by MacCarty and, more recently, 'cholesterosis' by Mentzer. The pathogenesis of this condition is now a source of acute controversy. Some investigators, *e.g.*, Sweet and Halpert, hold that it is evidence of absorption of cholesterol from the bile by the epithelium of the gall-bladder; others, *e.g.*, Elman and Graham, hold to the earlier view of Naunyn and Aschoff that the gall-bladder secretes cholesterol into the bile. Others, *e.g.*, Wilkie and Doubilet, insist that

the wall of the gall-bladder behaves as a semipermeable membrane and that passage of cholesterol in or out depends on the relative concentration in the blood and bile. In any case, as emphasized by Twiss and Killian, the concentration of cholesterol in gall-bladder bile as compared to that in hepatic bile is relatively much greater than that of other biliary constituents. That the gall-bladder epithelium has some secretory activity, apart from the secretion of mucus, is indicated by the experiments of Mann with rose bengal.

Until recently it was a question as to whether the gall-bladder ever really empties. For a long time Sweet and Halpert have insisted that it never empties at all. The introduction of cholecystography by Graham and Cole has done much to answer this question. When cholecystography is combined with duodenal drainage, the results in normal individuals may be dramatic. In such an experiment the patient is given the dye in the usual way. The following morning, duodenal drainage is started. If successful, dilute bile (the A bile of Lyon) is obtained. This bile contains little if any dye. Roentgenograms show the tip of the tube in place in the duodenum and a distended gall-bladder. Stimulation by magnesium sulphate or olive oil then produces a flow of dark concentrated bile (B bile) containing much dye. This is followed by a flow of light bile (C bile) containing little dye. Roentgenograms at the end of the experiment show a marked reduction in the size of the gall-bladder. While such experiments show that the gall-bladder does empty, there is an extensive experimental literature which indicates that it perhaps never empties completely, as does the urinary bladder, and several days may elapse before the entire content at any one particular time is removed.

Once it is accepted that the gall-bladder does empty into the duodenum, the question of the mechanism involved becomes paramount. The effect of respiratory movements, changes in intra-abdominal pressure, the elasticity of the viscus, variations in the tonus of the duodenal wall or of the sphincter of Oddi, and the existence of a reciprocal innervation between the sphincter and the gall-bladder have been discussed at length. More recently, attention has been focused on the rôle of the intrinsic musculature of the gall-bladder. Various observers from Doyon to Potter and Mann have noted that when the gall-bladder or common duct is connected to a manometer there are small rhythmic variations in pressure that could be interpreted as due to contractions. Boyden, Whitaker, and Higgins and Mann have conclusively shown contractions in the gall-bladder of various species from fish to guinea-pigs, cats and dogs. Cholecystography furnishes at least presumptive evidence that similar contractions may occur in man. Furthermore, Ivy and his students have shown the presence in animals of a hormonal mechanism (cholecystokinin) which produces contraction of the gall-bladder. They believe that the efficiency of such fatty substances as cream, egg yolk, olive oil and oleic acid in producing contraction and emptying of the gall-bladder is to be explained by their action in stimulating the production of cholecystokinin in the mucosa of the duodenum rather than to a specific stimulatory effect of these materials either on nerve endings in the duodenum before absorption or on the wall of the gall-bladder after absorption. Ivy has also shown the effectiveness of cholecystokinin in causing emptying of the gall-bladder in man.

The importance of the sphincteric mechanism at the duodenal end of the common duct, as pointed out by Giordano and Mann, must not be minimized. Ivy, Voegtlin, and Greengard have recently reported experiments on a human subject in whom, after the injection of the cholecystokinin solution, gall-bladder pain was produced by the contraction of the latter viscus concurrently with the development of spastic obstruction of the intramural portion of the common bile duct. In this case the intraduodenal administration of magnesium sulphate was effective in relieving the

spasm and distress. Since cholecystokinin is formed after the eating of fats, functional disturbances analogous to those in the subject reported by Ivy, Voegtlin and Greenard may explain some of the intolerance to fats, which is a frequent complaint of patients with chronic cholecystitis.

It is manifestly impossible at the present time to discuss, in detail, the pathologic lesions involving the biliary tract. Chronic cholecystitis with or without an accompanying cholelithiasis greatly exceeds all other lesions in frequency and medical importance. The problems concerned with the cause and formation of gall-stones are by no means settled. It is now recognized that the gastro-intestinal disturbances, which Moynihan considered the 'inaugural' symptoms of gall-stones, are the symptoms of cholecystitis and have no direct connection with the presence of stones. Whether gall-stones are the result of an antecedent cholecystitis or by mechanical irritation are responsible for the development of a subsequent cholecystitis is not a question that can be answered at the present time. In special cases it can be shown that one or the other of these two mechanisms is presumably responsible for the troubles of the patient, but in general they can be discussed together. However, if medical therapy is ever to supplant surgery in this field of medicine it will be necessary to recognize and correct disturbances in the biliary tract before the formation of calculi.

There are various predisposing causes that must be considered in relation to the production of either cholecystitis or cholelithiasis. Particular emphasis is placed on the effects of (1) biliary stasis, (2) infection, (3) disturbances in pigment excretion, or (4) cholesterol metabolism, (5) obesity and (6) pregnancy.

Biliary stasis with stagnation of the bile in the gall-bladder is important. Such stasis presumably permits greater concentration of the bile and so favours deposition of insoluble matter. It is further assumed that stasis favours the development of both infection of the bile and inflammatory processes in the wall of the gall-bladder.

Infection may involve either the bile or the gall-bladder, or both. Bacteriologic studies have found streptococci, which have been considered to result from focal infection arising primarily in the teeth, tonsils or appendix. Cholecystitis is a frequent complication in typhoid, and a residual infection of the biliary tract is responsible for many typhoid carriers. This is a cause of disease of the biliary tract, which we hope is of diminishing importance. These two types of infection are usually thought to be blood borne, though whether the organism reaches the gall-bladder through the bile, through the cystic artery or by lymphatic extension from the liver is a source of controversy. Hurst believes that the majority of cases of cholecystitis are due to infection with the colon bacillus and are the result of an ascending infection to the gall-bladder from the duodenum.

Metabolic disturbances may affect the excretion of either bile pigment or cholesterol. Small, irregular, dark brown or almost black stones composed of pigment and calcium with only slight, if any, degree of accompanying cholecystitis are frequently found in patients with congenital hæmolytic jaundice. According to Giffin, they occur in 58 per cent of such cases. In this condition it is recognized that there is a marked pleochromia of the bile as a result of the excessive excretion of bile pigment. Greene and Snell found in dogs that the intravenous injection of bilirubin or of hæmoglobin increased the excretion of pigment in the bile but that significantly this augmented rate of excretion was brought about primarily by an increase in concentration. They report two experiments in which the concentration of bilirubin in the hepatic bile rose to 1,000 mg. per hundred cubic centimetres, or from six to twenty times the usual normal values. Similarly, concentrated bile has been observed in dogs following the experimental production of anæmia by

the administration of phenylhydrazine. If such concentrated bile remains in the gall-bladder long enough to undergo much further inspissation, it would not be surprising if deposition of the excess pigment and calculus formation should occur.

Disturbances in cholesterol metabolism frequently result in the formation of gall-stones. The waxy, glistening gall-stone composed of a radiating mass of cholesterol crystals is most characteristic, but, according to McNee, only some 6 per cent of gall-stones are of this type. Twenty per cent are combination stones in which a cholesterol stone serves as a nucleus for the subsequent deposition of pigment and calcium; 64 per cent are mixed stones built up of concentric layers of cholesterol, pigment and lime salts. It is frequently assumed that the pure cholesterol stone is deposited as the result of a primary metabolic disturbance which may be independent of any element of cholecystitis. The effect of infection in causing the deposition of pigment and calcium is evidenced in the mixed types of stones. Pickens, Spanner and Bauman have recently pointed out that gall-stones, on the average, consist of 91 per cent of cholesterol with only some 3 per cent of pigment and 1 per cent of calcium present. Under these conditions the importance of cholesterol and of disturbances of cholesterol metabolism in the formation of calculi is obvious.

A tremendous amount of work has been done on different phases of cholesterol metabolism, but here also there is no final agreement as to the origin, function or fate of this material. According to the recent review of Muller it is probable that the cholesterol in the body is both endogenous and exogenous in origin. The relative importance of these two sources has not been finally determined, though most observers consider that the greater proportion of the cholesterol is absorbed from the food and is excreted in the bile. A smaller amount is excreted in the bowel. The presence of bile in the intestine favours the absorption of cholesterol but is not essential thereto.

According to this view the liver has a regulating function and is active in maintaining the cholesterol content of the blood at a fairly constant level. In some types of hepatic disease, especially when biliary obstruction is present, the cholesterol content of the blood is increased, while that in the bile is reduced. Normally, apart from the diurnal variations pointed out by Bruger and Somach, it is difficult to affect the cholesterol level of the blood, though slight and transient increases may be produced by a meal rich in cholesterol, particularly if fats are fed in addition. There is considerable evidence that, with the prolonged use of foods rich in cholesterol, hypercholesteremia develops and is accompanied by an increased excretion of cholesterol in the bile. Independently of the cholesterol intake, diets rich in fats or any other measure that produces an increase in the fat content of the blood also produce hypercholesteremia. Diets low in cholesterol, especially if they are low in fat as well, lead to a reduction in the cholesterol content of the blood. If hypercholesteremia is present, such diets frequently produce a return to normal but do not reduce the cholesterol content of the blood below normal. We have found hypercholesteremia in a large proportion of patients with chronic cholecystitis or cholelithiasis without biliary obstruction. The bile cholesterol is increased in some but not all cases. In these cases a diet low in cholesterol and at times the use of repeated duodenal drainages frequently results in a return toward normal of the blood cholesterol, associated with an improvement in the clinical condition of the patient.

There is a definite sex difference in the incidence of cholecystitis and cholelithiasis, and various factors have been proposed to explain the greater frequency in females. Two of the most important of these are obesity and pregnancy.

In obesity there seems to be a disturbance in cholesterol metabolism, but a definite relation between the cholesterol content of the blood and the degree of

obesity has not been established. Rapid weight reduction or starvation with mobilization of fat apparently liberates considerable quantities of stored cholesterol and produces a resultant hypercholesteremia. Under these conditions it should be emphasized that while weight reduction is important in the obese patient it should be gradual, and care should be taken to avoid stasis during the period of reduction.

Hypercholesteremia also occurs in pregnancy; apparently this is due in part to retention for, according to Pribram and to Baumeister, the bile cholesterol is at first reduced. In the later months of pregnancy and postpartum the retained cholesterol was found by McNee and Baumeister to be eliminated in part in the bile. Bodily activity is apt to be reduced during pregnancy and constipation is usual. In addition, Mann and Higgins have recently shown that the muscular activity of the gall-bladder is diminished in pregnant animals. All these factors promote biliary stasis and so favour the formation of calculi and the development of biliary infection during pregnancy.

The fundamental requirement for satisfactory results in the treatment of gall-bladder disease is a correct initial diagnosis. A careful and complete diagnostic work-up is essential, for there is no one method of diagnosis that is infallible. In the majority of patients, symptoms are usually indefinite. Typical colic is by no means always associated with stones. Physical examination is frequently of little assistance, except in acute conditions or in cases of jaundice. The limitations of cholecystographic study must be recognized, for a diseased gall-bladder may visualize and empty normally even though stones are present. Conversely, there may be no visualization on repeated cholecystographic examination and still laparotomy may reveal an apparently normal gall-bladder. We have found non-surgical biliary tract drainage a valuable supplementary method of diagnosis, provided the drainage is properly performed and the results are correctly interpreted, particularly in regard to the absence of concentrated bile or the presence of pathologic elements in the biliary sediment.

The selection of a group of 500 patients as having gall-bladder disease has been made in the clinic for diseases of the biliary tract at the New York Post-Graduate Hospital, in accordance with the complete diagnostic routine described elsewhere. In addition to the examination of the biliary tract, other tests such as urine analysis and blood counts have been done as a routine. When indicated, roentgenologic studies of the gastro-intestinal or urinary tracts have been made. The patients who gave evidence of biliary tract disease only have been studied over a period of three years, the initial diagnostic study being repeated periodically to determine the effects of treatment and to correlate these observations with the clinical course of the disease.

The general plan of medical treatment followed in these patients has been based on consideration of the foregoing principles and may be considered under the heading of (1) prevention of biliary stasis, (2) prevention or treatment of inflammation of the gall-bladder or bile ducts, (3) diet and (4) removal of calculi when once formed. So far, progress other than surgical in this last type of therapy has been nil and need not be considered further.

The value of attention to the general hygiene of the patient, of regular habits, moderate exercise, deep breathing, avoidance of constipation, freedom from mental strain and worry and the like has been amply demonstrated by experience. In the past this improvement has been ascribed largely to the relief of biliary stasis. Horseback riding has long been favoured to stir up a sluggish liver and cause emptying of the gall-bladder. In the light of present knowledge of the physiology of the biliary tract, it would seem now that the value of such measures is to be ascribed as much to the improvement in muscular tone and the state of

the general health of the patient as to any specific action on the gall-bladder. This remark, however, is not to be interpreted as in any way minimizing the importance of such general measures.

Removal of foci of infection, particularly as regards the teeth and tonsils, is important as a means of preventing or treating infection in the biliary tract. Hurst, among others, has emphasized the importance of attacks of indigestion or acute gastritis in permitting ascending infection of the biliary tract, particularly with colon bacilli. He also stresses the value of methenamine as a biliary antiseptic in such cases.

Various spas have long been favoured for the treatment of diseases of the liver and biliary tract. Apart from regulation of the hygiene of the patient and the use of diets, this type of therapy depends on the use of mineral waters. These contain saline cathartics in varying amounts, the active agent usually being magnesium sulphate, sodium sulphate, sodium phosphate or a mixture of these salts. It is now accepted that saline cathartics as well as the ever popular calomel have little action in stimulating the secretion of bile, but they prevent constipation, ensure regular action of the bowels, and favour emptying of the gall-bladder. The use of such a procedure, but questions of time and expense lessen its value as a routine therapeutic measure.

Alkaline powders when given before meals frequently relieve reflex gastric symptoms. Sedatives such as phenobarbital or bromides give excellent results, especially in nervous or neurotic patients. The use of these drugs with antispasmodics or alkalis at times is especially effective. We have used cholagogues with symptomatic relief in some cases, sodium dehydrocholate being the preparation usually given.

While the occurrence of a typical biliary colic followed by jaundice is diagnostic, it usually indicates the presence of gall-stones and the need for surgical rather than medical management of the patient. The early symptoms of cholecystitis, the 'inaugural symptoms of cholelithiasis' of Moynihan, are not localized to the biliary tract. Much of the epigastric fullness and distress, the flatulence and nausea of which these patients complain is due to disturbances in the activity of the stomach, duodenum and bowels, produced partly as a result of secondary reflex disturbances and partly as a result of interference with normal digestion. This relationship has been pointed out by von Noorden and Salomon, Chester Jones, and recently discussed in detail by Alvarez.

Von Noorden has called attention to the secretory disturbances of the stomach and intestinal tract which he attributes to catarrhal conditions. He states that gastric hypo-acidity may not produce any symptoms but nevertheless has an effect on the biliary tract, particularly in regard to the loss of protective action against external bacterial invasion. Hyperacidity, he feels, is more frequently associated with pain and furthermore produces excessive stimulation of the bile flow. This can be prevented by regulation of the acidity. Von Noorden also calls attention to the frequent association of the 'lazy colon' with gall-bladder disease. The importance of the spastic sigmoid is emphasized particularly, for it sometimes causes colic which may be mistaken for biliary colic.

The value of frequent small meals and of a bland, non-irritating diet that is free from coarse fibre and leaves only a small residue is generally accepted as basic in the treatment of chronic cholecystitis and the associated gastro-intestinal disturbances. The various topics previously discussed in this paper, however, show that no single diet is applicable to the management of all patients.

When the patient is obese, reduction in weight is imperative. In this case, fats should be eliminated from the diet and the intake of cereals and starches reduced to keep the total intake of food below the caloric requirements.

A certain proportion of patients with disease of the biliary tract complain of intolerance to food. Some have been literally 'afraid to eat' and are semistarved and underweight in consequence. In such cases the bland diet is important. In addition, when the patient is underweight every effort should be made to increase the calorie intake. Frequent feedings, either four or five small meals daily or the use of intermediate nourishment between the usual three meals, a liberal intake of starches and cereals, and, if possible, the addition of cream, butter or olive oil to the diet is desirable to facilitate gain in weight.

In some instances the intolerance to food is due to reflex gastric disturbances with the development of the syndrome of hyperacidity, which is usually considered characteristic of peptic ulcer. In such cases a modified ulcer type of management with or without the use of alkalis is indicated.

Many patients show a definite intolerance to fats. The importance of bile in the absorption of fats has long been known. This is partly due to its action in activating the pancreatic lipase, partly to the action of the bile salts favouring emulsification and solution of the fats and partly, as more recently emphasized by Wieland and Sorge and by Verzar and Küthy, to the formation of addition compounds between the bile salts and the fatty acids, which are thereby absorbed directly into the portal blood stream.

Friedrich von Müller long ago showed the great diminution in the absorption of fat that occurs in the presence of complete biliary obstruction. Many patients with cholecystitis complain of discomfort following a fat meal, which is probably best explained by the effect of fats in stimulating the formation of cholecystokinins. This stimulates the gall-bladder to contract and, in the presence of active inflammation or of any disharmony in the reciprocal action of the gall-bladder and the sphincter of Oddi, may well cause pain. On the other hand, if there is no intolerance, cream, egg yolk, olive oil or oleic acid are valuable additions to the diet, for in the presence of a functionally competent gall-bladder they stimulate the formation of cholecystokinins and aid biliary drainage.

The significance of hypercholesteremia in relation to the possible formation of gall-stones has already been discussed. The routine determination of the cholesterol content of the blood is a valuable procedure in these patients. When this value is increased, foods rich in cholesterol, such as brain, eggs, butter, goose, duck,

liver, sweetbreads or cream, should be excluded from the diet.

This represents a compilation of the majority of values given in the literature for the cholesterol content of food. Many of the analyses are old. The need for an accurate and comprehensive series of analyses of the cholesterol content of food is obvious. In the past, beans and peas have been proscribed, but Schoenheimer has recently pointed out that while they contain considerable amounts of sterol the latter is not cholesterol but phytosterol, which is not absorbed by the mammalian intestine. These vegetables may therefore be included in the diet.

GENERAL DIRECTIONS FOR USE WITH THE GALL-BLADDER DIETS

Meals.—Meals should be small in amount and taken at the same time each day. Large meals and overeating are detrimental. Chew all food carefully; the teeth must be in good condition.

Rest.—A rest of a half hour lying down should be taken after the noon and evening meals. This allows the food to digest, which is impossible with mental or physical work immediately following meals.

Bowel movements.—An effort should be made to move the bowels every day after breakfast, regardless of inclination. If the bowels do not move every day this should be reported to the physician so that medication may be prescribed.

Exercise.—A proper amount of outdoor exercise is essential for the proper functioning of the gall-bladder and all other organs. A walk of at least forty blocks should be taken every morning, deep breathing being taken at this time to stimulate the action of the gall-bladder.

Water.—At least eight glasses of water are to be taken daily. A glass of water, preferably hot, should be taken on arising in the morning. The other water should be taken between meals rather than with meals.

Medication.—As directed by the physician.

CONCLUSION

If due attention is given to the physiologic disturbances responsible for the symptoms of which the patient complains and if physiologic principles are kept in mind during the treatment, improvement is possible in the present medical management of diseases of the gall-bladder and biliary tract.

Reviews

A HANDBOOK ON DIABETES MELLITUS AND ITS MODERN TREATMENT.—By J. P. Bose, M.B. (Cal.), F.C.S. (Lond.). With a foreword by Major-General Sir John Megaw. Second Edition. 1934. Thacker, Spink and Company (1933), Limited, Calcutta. Pp. xviii plus 232. Illustrated. Price, Rs. 6-8

THERE are few parts of the world in which diabetes does not occur so that it cannot be considered in any way a tropical disease. 'Why then', one might ask, 'is the disease being studied in a tropical diseases institution?' The answer is that though it is a universal disease, diabetes as it occurs in India presents very special features that merit special investigation. This constituted the *raison d'être* for the foundation of a scholarship for diabetes research at the Calcutta School of Tropical Medicine—the other essential was provided by the generous endowment of this research post by Mrs. M. Mitra, in memory of her husband the late Rai Bahadur Dr. Ashutosh Mitra of Kashmir.

One of the most important results of the foundation of this scholarship was the publication by Dr. Bose, the first occupant of this research post, of a *Handbook*

on *Diabetes Mellitus*. The urgent need for such a book was obvious, as, of the scores of books that had been published on this important disease, none fulfilled the requirements of the practitioner, or dealt with the special aspects that it presented, in this country. It is not surprising that this book was very popular and that the edition was soon exhausted; the book under review is the second edition of this book.

The whole subject of diabetes is dealt with in a systematic and practical manner. All the advances in our knowledge of this disease that have been made in Europe and America have been carefully followed and interpreted in terms of the problem, as it presents itself in India, and to these have been added Dr. Bose's own contributions to the problem in the form of his researches into the subject during the last thirteen years. Perhaps one of the most important points emphasized is that the discovery of insulin has placed a very valuable instrument into the hands of a well-informed medical man but a very dangerous weapon into the hands of the ignorant one; with this little book available no medical man has any excuse for remaining in the second category.

This second edition has been completely revised and a chapter or so added. An important addition is the chapter on diabetes in children, which appeared not very long ago as an article in this journal.

The book is worth its purchase price for the appendices alone, as here is to be found information about standard diets for Indian patients of different ages and about the composition of different articles of Indian dietary that will be found collected together nowhere else.

It has become a habit in this country for writers of books to persuade the occupant of a high administrative post, who may know nothing about the subject-matter of the book, to write a foreword: the argument being that a wine of doubtful quality requires the largest possible bush. Here the case is quite different, the writer of the foreword is primarily a physician and a scientist, only incidentally occupies a high administrative post, and his praise can do nothing but add to the confidence of the reader.

The book is of course written primarily for the medical man but it contains information which the patient himself should have at his disposal and we suggest that it would be a good book for the doctor to recommend to his well-to-do and more intelligent patients.

The author has a straightforward and clear style and his English is irreproachable; the publishers have played their part well and have produced a handy and neat volume; the paper is thin but fully opaque, and the type is clear. This second edition will certainly enhance the established reputation of the book.

THE PRACTITIONERS' LIBRARY OF MEDICINE AND SURGERY. Volumes V and VI. Volume V:—Traumatic Surgery, and Volume VI:—Obstetrics and Gynaecology. 1934. D. Appleton-Century Company, New York and London. Volume V:—Pp. xiv plus 1080. Illustrated, and Volume VI:—Pp. xiv plus 900. Illustrated. [Available from Messrs. Butterworth and Company (India), Limited, Calcutta.] Price, Rs. 37-8 per volume

THE fifth and sixth volumes of this very ambitious and, so far, very successful encyclopædia of medical practice have now been published. The division of the subject of surgery into non-traumatic and traumatic was an original idea, and appears to have been a successful one. The volume of non-traumatic surgery has already been reviewed in these columns. Volume V, on traumatic surgery, necessarily covers the whole subject of orthopædics, but its scope is much wider than this, and it naturally includes injuries to the soft tissues and to the various organs. The subjects fall under the main headings: trauma to the skin and subcutaneous tissues—including burns, fractures, dislocations, amputations, injuries to joints, bursæ, muscles and tendons, and injuries to head and neck, thorax and thoracic viscera, abdomen and viscera, genito-urinary tract, spine and spinal cord, nerves and blood vessels; the surgery of the hand is given a special chapter, and there are concluding chapters on traumatic shock, on post-traumatic states, and on the industrial aspects of the subject.

Each subject has been dealt with under the headings, definition, ætiology, anatomy, physiology and pathology, symptoms, diagnosis, prognosis, and treatment.

The subject of this volume is one that has seen very great advances during the last twenty years; for example, the whole principle of the treatment of fractures has undergone a change, largely brought about by war and immediate post-war experiences, and a better knowledge of the anatomy of the fascial layers of the hand has led to improved treatment of injuries and infections of this important member.

The subjects lend themselves to illustration and have been illustrated freely and efficiently; one series of illustrations will appeal to the practitioner for ready reference when he is faced with a case of injury to the

spine; this series shows the areas of anaesthesia following injury to the spinal cord at different levels.

It is difficult to offer any special criticism, but the general impression made is that, though the book no doubt summarizes the best American teaching, that of the European school might have been incorporated now and then with advantage, especially that of Böhler in Vienna.

In certain ways volume VI, on obstetrics and gynaecology, will be the most important volume in the series. As the editors say, the profession, to its credit, is becoming more and more maternal-mortality conscious each year. Obstetrics is not a subject in which dramatic advances are registered very frequently; the physician usually plays a very secondary part during the physiological process of bringing children into the world, but though he does little what he does is of the very greatest importance; it is therefore essential that he should keep his knowledge up-to-date, in order that he may keep the maternal mortality in his own practice down to an irreducible minimum.

The subject of obstetrics is divided into large chapters with the following titles:—The physiology of pregnancy—this includes the diagnosis of pregnancy, prenatal care, and presentation and position, the physiology of labour—including the mechanism of labour, the management of normal labour, and the newborn child, the physiology of the puerperium, the pathology of pregnancy, the pathology of labour, the pathology of the puerperium, and obstetrics surgery. The second part of the volume is devoted to gynaecology; here the subject is dealt with regionally.

In a volume of this size it is of course possible to treat the subject fairly fully, and the writers have attempted to describe in detail all the procedures that the general practitioner is likely to have to carry out himself in the course of his practice, but at the same time they have not excluded specialist subjects, as they feel—and we agree with them—that it is important for the practitioner to know something about the special procedures which he would not normally undertake, because, unless he does, he cannot advise his patients intelligently or give them any idea of what the result of their visit to the specialist is likely to be.

There is one minor criticism; we notice that under the heading of ulceration of the vulva the recent advances in our knowledge of the ætiology of the conditions now grouped under the heading lymphogranuloma inguinale, or poradenolymphitis have not been included, and these different conditions are not grouped together.

In conclusion it may be said that these two new volumes are quite up to the standard set by their predecessors, which was a high one.

Butterworths are the agents in India and the whole set may be obtained from them on the extended-payment system.

DISEASES OF THE EYE.—By Sir John Herbert Parsons, C.B.E., D.Sc., F.R.C.S., F.R.S. Seventh Edition. 1934. J. and A. Churchill, Limited, London. Pp. viii plus 695, with 21 plates and 353 text-figures. Price, 18s.

THIS excellent and popular textbook of ophthalmology which first appeared in 1907 needs no introduction and the new edition must receive the welcome it so rightly deserves.

Since the appearance of the last edition in 1930 our knowledge of ophthalmology has considerably advanced and the author has incorporated the most important advances. The chapter on the physiology of the eye has been re-written in the light of our present knowledge.

Too much praise cannot be given to the book which is written in a clear lucid style and well illustrated with text-figures and plates.

As the book is immensely popular and largely used in all parts of India, the only criticisms that the

reviewer would like to make are that there are no references to the ocular complications of leprosy, and superficial punctate keratitis of Fuchs which is so common in epidemics during and after the rainy season. No mention is made of Webster's mucous graft operation for the radical cure of ectropion and trichiasis resulting from trachoma.

To medical practitioners and students the book is strongly recommended as the best medium-sized textbook of its kind and should be indispensable to every medical man working in India where so much eye disease is everywhere to be found.

E. O'G. K.

ATLAS OF EXTERNAL DISEASES OF THE EYE.—By H. Neame, F.R.C.S. 1934. J. and A. Churchill, Limited, London. Pp. 111, with 51 plates. Price, 15s.

THE subject of external eye diseases lends itself so readily to the atlas form of treatment that we are surprised that it has not been adopted before. The book consists of fifty-one coloured plates depicting different eye diseases of which there is external evidence of the changes that have occurred; opposite to each plate is a short description of the condition, under the headings: synonym, symptoms, diagnosis, ætiology, pathology, prognosis, and treatment. The description never occupies more than one page, so, it will be gathered, the subjects are treated concisely, often in one line; this of course is just what is required.

The illustrations, which have been collected from a number of sources, are excellent. We can imagine this book having a very wide sale amongst final-year medical students and house surgeons, who will find it invaluable in an outpatient department and will treasure it all their practising lives. It really is a book for which there has been a 'long-felt want'; we foretell a great future for it, and both author and publishers have our best wishes as they have shown great enterprise; coloured illustrations are expensive to reproduce and to issue a book containing fifty-one at the modest price of this volume is an achievement.

SURGICAL ANATOMY AND PHYSIOLOGY.—By Norman C. Lake, M.D., M.S., D.Sc. (Lond.), F.R.C.S., and C. J. Marshall, M.D., M.S. (Lond.), F.R.C.S. 1934. H. K. Lewis and Company, Limited, London. Pp. lx plus 888, with 238 illustrations. Price, 30s.

THE book is divided into two sections, general and regional. The general section consists of nine chapters, describing 'the main physiological and pathological principles underlying surgical treatment'.

These chapters are exceedingly well presented, evenly balanced, and thoroughly up-to-date. The regional section consists of forty-five chapters and covers the whole of the body. The scope of each chapter is given 'whenever appropriate' as follows:—'development, anatomy, structure, physiology, pathology, operative and practical application'. It will be seen that this book is something more than a textbook of surgical anatomy and physiology.

The illustrations are good. There are several minor criticisms. Firstly, figure 141 showing a diverticulum of the lesser curvature of the stomach as seen through a gastroscope is somewhat out of place, also figure 235, vasography. In place of these, an illustration of a development of the palate and one showing cerebral localization might have been inserted. A student will have some difficulty in following figure 114 showing Kanavel's palmer space.

A word must be said concerning the index. The authors have overcome the students' difficulty with anatomical terminology by giving both the old and new anatomical names. Such an arrangement must save time and annoyance when looking up a subject hurriedly.

The paper is good and the printing bold. This is a book for which there has been a definite want, and should be in the hands of students during their final year.

F. J. A.

MANIPULATIVE TREATMENT FOR THE MEDICAL PRACTITIONER.—By T. Marlin, M.D., M.B., Ch.B., D.P.H., D.M.R.E. 1934. Edward Arnold and Company, London. Pp. vii plus 133. Illustrated. Price, 10s. 6d.

THAT there is a definite want amongst the profession at the present time for works on the subject of manipulation is shown by the publication recently of several books. In order not to overburden the subject, the author has omitted 'theories and explanations which are commonly adduced'.

The reviewer many years ago had several manipulative demonstrations to him by what was known in those days as a 'bone-setter', nowadays as an osteopath.

It is the first time as far as we know where an author has stated in print his debt to the osteopath. There is no doubt that many patients are improved and some cured by the manipulations of osteopaths. The busy practitioner can do the same if he will spend a few hours in mastering the manipulations which are very clearly represented in this book. He will be well repaid for the time spent when he sees the rapid response to manipulation of the vague pains around the shoulders, neck and head.

The author re-introduces to the profession the 'scapular hold' and the 'leather strap'. The latter is of great service to the practitioner working alone; the manipulations themselves are also rendered less arduous. Whether the busy practitioner should be recommended to manipulate some of the larger joints is a matter of opinion. Many will no doubt feel very dubious and rightly so.

We recommend this book to the profession.

F. J. A.

AIDS TO OPERATIVE SURGERY.—By C. P. G. Wakeley, D.Sc. (Lond.), F.R.C.S. (Eng.), F.R.S. (Edin.). Second Edition. 1934. Baillière, Tindall and Cox, London. Pp. viii plus 225, with 3 figures. Price, 3s. 6d.

MR. WAKELEY'S *Aids to Operative Surgery* is a handy book on the subject. It consists of eleven chapters and its arrangement has been brought into line with the bigger textbooks. It is remarkable that within such a small compass, so little of importance has been left out. For the student, desirous of rapid review in preparation for examinations, this little book will be of assistance. The inclusion of illustrations has definitely added to its value. An adequate index is appended.

P. N. R.

THE RELIEF OF PAIN IN CHILDBIRTH.—By F. Neon Reynolds, M.C.O.G., F.R.C.S. (Ed.). 1934. Medical Publications Limited, London. Pp. 114. Price, 10s. 6d.

THIS small book gives a clear and detailed account of methods which can be used for the relief of pain in labour. These methods are not confined to the use of drugs alone. Dr. Reynolds points out that careful treatment of the minor disabilities of pregnancy, so often neglected, will greatly increase the patient's chances of a safe and easy delivery. The successful treatment of these will conserve the patient's physical and nervous energy, will tend to allay fear, and will give the patient confidence in the ability of her medical attendant to see her safely through her confinement. The author has found that heartburn which is a very common and distressing complaint can usually be relieved by the use of alkalis, or, when they are not

successful, by the administration of small doses of dilute hydrochloric acid, particularly in the latter months of pregnancy. He suggests that on this question there is a useful field for minor research. Turning to drugs a concise yet full account is given of the more useful ones, including the newer anaesthetics. A note of warning is sounded in regard to the barbiturates, which are dangerous drugs not suitable for routine administration, though they may be of use in individual cases in experienced hands.

Drugs are divided into those suitable for the first stage when the object should be to give sleep between the pains, and those suitable for the second stage when pain should be relieved but when it is also desirable for the patient to return quickly to consciousness between pains. For the first stage a preliminary dose of morphine and hyoscine followed by the rectal injection of paraldehyde in olive oil is recommended for primiparae, while paraldehyde alone will nearly always be sufficient for a multipara. The drug for the second stage is chloroform, or nitrous oxide and oxygen if available. A chapter is given to the vexed question of anaesthetics for midwives' cases. The method of giving paraldehyde would be suitable for administration by midwives. The author also holds that a practically fool-proof apparatus for the administration of chloroform by midwives could be devised, but this has not yet been done.

J. M.

HANDBUCH DER CHEMOTHERAPIE.—By Viktor Fischl and Prof. Dr. Hans Solossberger. Vol. II. Metallerivatives. Publishers: Fischl'sche Medizinische Buchhandlung, Leipzig. 1934. Pp. xi plus 540. Price, 55 Marks

THE review of the first volume of this work appeared in the *Indian Medical Gazette* (Vol. LXVII, p. 593), and it was pointed out that the work was more comprehensive than any other volume that had appeared so far. The present volume is a continuation of the previous one and deals with the metallic compounds used in chemotherapy. The subject is discussed under the following sections: (1) Arsenic; (2) antimony; (3) bismuth; (4) iodine; (5) copper; (6) silver; (7) gold; (8) mercury; (9) rare metals, and (10) other elements. In the case of each element, the history, the chemistry, the use of the metal, the inorganic derivatives, the complex organic salts and the different metallo-organic derivatives, their toxicology, therapeutic results, mode of action, etc., have been described; this is followed by a register of the literature. The second volume also furnishes a complete index for the first and second volumes, besides including the contents of both the volumes. The issue of this volume thus completes the collection of all the useful information on the subject and will be welcomed by all interested in the advances of chemotherapy and also in problems connected with it.

S. G.

Abstracts from Reports

ANNUAL REPORT OF THE PUBLIC HEALTH COMMISSIONER WITH THE GOVERNMENT OF INDIA FOR 1932. VOLUME II

PRINCIPAL DISEASES AFFECTING THE BRITISH ARMY

Dengue, sandfly fever and pyrexia of uncertain origin

MORE than 60 per cent of the cases of dengue come from the garrisons stationed in ports, and of these Calcutta, as usual, supplies the lion's share. There have however been no severe outbreaks, and the admission ratio shows a decline.

Sandfly fever continues to be a source of considerable anxiety. Although the mortality rate is nil, and the stay in hospital which this disease occasions is short, the morbidity rate during the season of incidence is high and the incapacitating effect is serious. The majority of cases occur in the North-West Frontier Province and in Northern Punjab, and, by reducing considerably the number of effectives, adds greatly to the discomforts and worries of the hot weather.

It will be recalled that in 1925 an investigation was made under the auspices of the Indian Research Fund Association into the problem of sandfly breeding at Landi Kotal, a garrison in the Khyber Pass which usually shows a high incidence of sandfly fever. Extensive breeding grounds were discovered in nullahs which intersect the camp, and methods for their destruction were devised. For the first few years thereafter the sandfly fever incidence dropped, and it appeared that something had been achieved. Of late, however, sandflies and cases of sandfly fever have been as numerous as ever, and this in spite of the fact that the breeding grounds in question are still very effectively treated, and are not now the source of the trouble.

Certain observations suggest that infection is not being acquired in the barrack-rooms, but during night duty while manning the trenches guarding the perimeter. If so, this considerably widens the problem.

The question of the habits and bionomics of the sandfly have again been taken up, with the assistance of the Indian Research Fund Association, and further investigations into the location of the breeding grounds

and other practical points of importance are being made, from which it is hoped that good results will accrue.

Fever of the typhus group

The diagnosis of sporadic cases of this condition is becoming much more common, probably due to a more universal recognition of the symptoms of the disease rather than to an increased incidence, as in the past there is little doubt that many cases of this disease were included in the P. U. O. series. In all, 34 cases were reported among all ranks and families, British and Indian, entitled to hospital treatment, with 4 deaths.

The Weil-Felix reaction has been positive in a proportion of cases, but hitherto the technique has not been sufficiently standardized to permit of conclusions being drawn therefrom. Efforts are now being made to carry out in all cases a series of tests with 'O' emulsion of *B. proteus* X2, X19, and Kingsbury. Attempts are also being made to isolate strains of *B. proteus* from these cases in the hope that one giving a specific reaction may be discovered.

The question of aetiology is of interest. While the general picture of the cases corresponds to tick typhus as described by Megaw and others, in the majority of cases it has been impossible to obtain a definite history of tick bite. In many cases, however, there was a relationship between the onset of the disease and recent residence in forest bungalows, camps, etc., which is in keeping with the hypothesis that this is a disease of the wilds, normally occurring in some lower animal which constitutes the reservoir of infection, and conveyed to man by some parasitic arthropod which occasionally selects him as a host. In a few cases there was a suggestive local adenitis. Louse infection can be definitely excluded in the majority of cases. The suggestion of the vector is receiving special attention.

In a small group of five cases which occurred in one cantonment louse infestation was suspected, although not proved. It was not specifically noted that the patients were lousy, but subsequent investigations revealed this condition in certain of their comrades. These cases showed 'no recent movements', and were

of a very severe type, two of the five patients dying (one British and one Indian soldier).

Enteric fevers

British troops.—There is an increase from 1931 of six admissions for typhoid fever and seven for paratyphoid A fever, and a decrease of one for paratyphoid B and seven for enteric group, there being an increase of five for the whole group.

Indian troops.—There is a decrease of twenty-one admissions for typhoid fever, four for paratyphoid A fever, three for paratyphoid C, and twenty-eight for enteric group, while paratyphoid B fever shows an increase of one. This gives a decrease of 55 cases in the group.

Dysentery, diarrhoea and hepatitis

There is a well-marked decrease in the total admissions for these bowel diseases, which would be much more noticeable were it not for the exceptionally high incidence in one station (Quetta).

Carriers

The examination of food handling menials prior to enlistment and at intervals during their first month of service continues. In all, 13,681 menials were examined with a total of 42,705 bacteriological examinations and 32,645 microscopical examinations, resulting (as far as dysentery is concerned) in the discovery of *B. dysenteriae* Flexner in thirty-five of these men, *B. dysenteriae* Shiga in five and *B. dysenteriae* Schmitz in three, while cysts of *E. histolytica* were found in 388 (2.83 per cent).

In view of the fact that no appreciable decrease in the total dysentery and diarrhoea figures has occurred during the five years in which an extensive search for dysentery carriers has been in operation, the question of the value of these examinations has recently been considered and the following facts emerge.

Bacillary dysentery

There is no record of the discovery of a true carrier of bacillary dysentery (i.e., a normal individual who, while suffering from no symptoms, regularly or intermittently excretes dysentery bacilli). In supposed cases which have been carefully investigated, the so-called carrier has proved to be an individual who has had the misfortune to be called up for examination at a time when he was suffering from an attack of dysentery, either primary or, in a chronic case, relapse.

There is no doubt that for every one case found in this way during 'carrier' tests, innumerable others occur at other times of which nothing is known. It is obviously both unjust and illogical to penalize the unfortunate who happens to be discovered when it is well known that there are many others who differ only in that they have not been detected. Further, a sequel of the present system is, that whenever possible the disease is concealed, and the man continues at work during the only period when he is definitely infective.

It is proposed to change this policy, and to direct attention towards encouraging the active case to report sick and be struck off duty until non-infective. Intrac-table chronic or relapsing cases will be discharged.

Amoebic dysentery

The relationship of the *E. histolytica* carrier to the occurrence of frank cases of amoebic dysentery is a question which merits close attention. During the years in which the search for these carriers has been in vogue in India various anomalies have come to light.

In the first place it is well known that, despite the precautions taken, many carriers escape the net and are employed in duties which involves food handling. The percentage of carriers who are detected varies within wide limits from district to district, and in certain cases from year to year, in a way which makes it clear that

in many localities the number of undetected carriers must be much higher than in others. The incidence of amoebic dysentery, on the other hand, pursues a steady course, and in no way reflects the variations which exist in this supposed reservoir of infection.

Again, in one large station careful records have been kept of the incidence, by units, of cases of amoebic dysentery. In no time has the distribution suggested infection from a carrier; on the contrary, it has been roughly proportionate to the numbers at risk.

Another anomalous finding is that the annual number of carriers detected is in excess, and in some stations greatly in excess, of the number of cases of amoebic dysentery. This has its counterpart in the state of affairs in the United Kingdom, where considerable numbers of the population are cyst-passers but where there is no amoebic dysentery.

The only conclusion which can be drawn from these observations is that the carrier is only one of many factors concerned in the spread of amoebic dysentery.

Admittedly the complete protection of an individual from infection with cysts would eliminate amoebic dysentery. Such a measure of protection has been the goal of the system in vogue, but in Indian circumstances has proved impossible of attainment. The half measure of success which has been realized has produced no results, and, on the other hand, has in many cases resulted in grave injustice to the individual and much inconvenience to his employers.

In view of these facts, the conclusion has been reached that the present policy is not a practical proposition: routine investigations for the exclusion of carriers will therefore be abandoned.

An interesting feature of the year is the marked increase in dysentery which took place in Quetta, the ratio being for British troops 64.3 as opposed to 22.9 in 1931 and an average of 19.5 for the three years 1929 to 1931. This increase occurred in the amoebic as well as in the bacillary type, but was relatively more marked in the former.

The outbreak was more or less equally distributed among all units and also amongst families. Bacillary dysentery reached its peak in June and July; a wave of amoebic dysentery occurred four to five weeks after the July rains, and another a similar period after some heavy spates which occurred in August.

The cause of this outbreak was the subject of much investigation. The year was an unduly dry and dusty one in its early months, and the possibility of the outbreak being associated with irritation from dust was carefully considered but the findings were inconclusive.

There was no notable increase in the number of flies. This observation is interesting when compared with the state of affairs in Poona, a station which has normally a relatively high dysentery ratio, and which this year showed therein a marked reduction accompanied by a corresponding freedom from flies.

Tropical abscess of liver and hepatitis

In all 112 admissions were made for the above condition.

A scrutiny of the case cards shows that of these 69 were probably amoebic in origin. In this figure are included one case which relapsed once and another which relapsed twice.

The difference between amoebic abscess and amoebic hepatitis is one of degree only. Of the above cases, 16 were sufficiently advanced to be called amoebic abscesses, and of these three died. The majority of cases responded readily to emetine treatment.

Cysts of *E. histolytica* were discovered in the faeces of only four of these cases. (This statement is difficult to understand.—Editor.)

Malaria

The incidence for the years 1931 and 1932 are shown in the table.

TABLE
Malaria ratio per 1,000—British

Year	Fresh	Relapse	TOTAL
1931	64.8	47.7	112.5
1932	49.2	34.9	84.1

From these figures it will be seen that malaria maintains its pride of place as the scourge of the army in India. In 1932 admissions for this disease formed 14.5 per cent of the admissions for all forms of injury and disease; and this percentage only represents hospitalization; it neither includes out-patient attendance, nor indicates the degree to which the disease adversely affects general physical efficiency.

It is, therefore, impossible to regard these figures with equanimity; but although, in an absolute sense, they are profoundly disturbing, in a relative sense they are not without a certain amount of comfort and encouragement, since the situation seems to maintain the steady, if somewhat slow, improvement which has been a feature of recent years. This is especially evident in the case of the Northern Command, in which malaria plays more havoc amongst the troops than in any other area in India. In this command, a steady decline is shown in the admission rates (per 1,000) during the past eight years from 291.00 in 1925 to 91.15.

During the past ten years the all-India figures have varied much, from those of 1924—the worst year—to those of 1932, the best.

Prophylactic quinine

As regards the prophylactic value of quinine, the usual conflict of opinion is found in the annual reports of districts and commands. On the whole, army medical opinion of to-day is not enthusiastic. Peshawar District experienced an unusually low malarial incidence, and the health officer there made the following remarks on the subject:—

'This measure of malaria prevention or, rather, early cure was practised throughout the district in all plains stations as regards both British and Indian troops from August to November. The dose given was ten grains of quinine sulphate daily with a small dose of magnesium sulphate with the exception of Sundays when nothing was given.

A considerable amount of work has been carried out in previous years in the Peshawar District, particularly by Major T. Young, R.A.M.C., in connection with quinine prophylaxis, and, apart from his findings which indicated definitely a lower incidence of malaria in troops given prophylactic quinine than in others, a large body of expert opinion is in favour of the measures.

It is thought that until some more satisfactory means of protection of troops is found, quinine prophylaxis must continue to be adopted in special circumstances such as years likely to produce an epidemic or very high incidence of malaria and in special conditions such as on field service, when mosquito nets cannot be used, and practically no other method of prevention is available'.

However, these opinions would not be accepted in their entirety by every military medical officer in India. The more usual experience is reported from another district in which a heavy malarial incidence occurred, thus:—

'Prophylactic quinine was issued in the three biggest stations in the district. No apparent benefit followed. In one station certain units were kept as controls, but in these the malarial incidence was no higher than in the protected (*sic*) units.

Atebrin was introduced into army practice too late in the malaria season of 1932 to permit of definite

conclusions being reached regarding its comparative value. Reports on which to base such conclusions will not be available until the middle of 1933. In the meantime preliminary reports indicate that the clinicians are impressed with the efficacy of this drug. It is generally held to be as powerful in action as quinine; but most observers report that it is slower in getting to work. They prefer to start a course of atebriplasmaquine treatment with a preliminary administration of quinine for the first two days—although this is not in accordance with the latest report on the subject'.

Again there has to be recorded a marked decline in the numbers admitted to the Malaria Treatment Centre, with a consequent shortage of clinical material. Undoubtedly this reflects the more efficient methods of treatment in vogue in the hospitals outside.

Experimental trials of an outfit designed for the field diagnosis of malaria and dysentery are now nearing a successful conclusion.

There is no doubt that the appearance of plasmaquine and atebriin has re-awakened interest in the whole subject of malaria in the army in India; and credit is due to all the clinicians and epidemiologists who have been working on the problem throughout the year: they have risen to the occasion.

Effects of heat

Recently there has been a revival of interest amongst medical officers in the interesting conditions which are included under this heading. Fresh observations and methods of treatment are in train, the results of which may be published later.

Ophthalmology.—The enlistment of recruits suffering from mild trachoma continues to give successful results. The opinions of recruiting medical officers are in conformity with that of a distinguished ophthalmologist in civil practice, who writes:—

'I can speak from 33 years' Indian experience and I am quite convinced that there are many mild cases of trachoma which are not only amenable to treatment, but which will eventually clear up without treatment. One sees hundreds of these cases each year.

Regarding the contention that these are not cases of trachoma at all, but forms of chronic conjunctivitis, it is not possible to be dogmatic—for only experience can enable one to diagnose between early cases of trachoma, angular conjunctivitis and follicular conjunctivitis.

But in my opinion it is perfectly safe to accept recruits with mild trachoma; in fact, in some parts of India, especially in Sind, there are few eyes that do not show some signs of trachoma and yet give rise to no symptoms at all; and these signs are only found in apparently healthy eyes on evertng the upper lids. If all recruits are rejected because they have some signs of mild trachoma, the field for recruiting will be enormously curtailed. Furthermore, in mild cases of trachoma at the age at which recruits are taken, the risk of infection is so small, as to be almost negligible'.

BENGAL PUBLIC HEALTH REPORT BY DR. R. B. KHAMBATA, D.P.H., DIRECTOR OF PUBLIC HEALTH, BENGAL. REPORTS OF THE BENGAL SANITARY BOARD AND THE CHIEF ENGINEER, PUBLIC HEALTH DEPARTMENT, FOR THE YEAR 1931

THE report for the year 1931 of the Public Health Department which has just come to hand contains an immense amount of data covering a wide field in public health matters. It is impossible in a small space to do more than touch on some of the more important topics of direct medical interest.

Population.—According to the census of 1931 the population of the Bengal Presidency, excluding the Bengal States and the Chittagong Hill Tracts, is 49,901,030, which is 3,378,787 in excess of the population enumerated in the preceding census of 1921. The

natural increase of the population during the decade was, therefore, approximately 337,878 per annum.

The largest increase was recorded in the Chittagong Division (excluding the Hill Tracts) and the smallest in the Rajshahi Division. Six districts, showing the largest percentage increase of population during the decade, are Noakhali (+15.9), Tippera (+13.3), Darjeeling (+13.0), Bakarganj (+12.9), Murshidabad (+12.0), and Chittagong (+11.5). Of these, three districts belong to the Chittagong Division. Only two districts, namely Jessore (-3.0) and Rajshahi (-4.6), recorded decrease of population during the decade.

Provincial births and birth rates.—Excluding still-births, the number of children born during the year 1931 was 722,091 males and 666,125 females or a total of 1,388,219 against 613,885, 591,046 and 1,237,931, respectively, in 1930. The birth rate is 27.8 per mille of population in 1931, against 26.6 per mille in 1930. Thus during 1931 the birth rate shows an increase of 1.2 per mille of population as compared with the corresponding figures for 1930. The birth rate is 26.2 per mille in the previous quinquennium, the birth rate for 1931 being 27.8 per mille. There is an increase of 1.6 per mille of births in 1931 as compared with that of the previous quinquennium. The number of males born to every 100 females in 1931 was 108 and in 1930 the corresponding figure was also 108.

Provincial deaths and death rates.—During the year 1931, 1,113,312 deaths were registered in the province, representing a death rate of 22.3 per mille from all causes. The corresponding figure for the year 1930 is 1,044,256 or 22.4 per mille and 22.7 during the previous quinquennium. The death rate was still further reduced by 0.5 per cent as compared with 1930. It was reduced by 1.8 per cent when compared with the quinquennial figure. It was thus lowest on record since 1900. Five hundred and seventy two thousand, eight hundred males and 540,512 females died during the year 1931, while 539,260 males and 504,996 females died during the year 1930. One hundred and five males died to every 100 females. The death rate from various causes is shown below:—

six months and 16.0 per cent at the age period of between six and twelve months.

Cholera

Cholera accounted for 79,073 deaths, giving a death rate of 1.6 per mille in 1931 against 54,963 deaths and a rate of 1.2 per mille in 1930, thus showing an increase of 33.3 per cent. It was 11.1 per cent less than the average of the previous quinquennium (1.8). 7.1 per cent of the total deaths in the province in 1931 were due to cholera. Deaths from cholera were reported from 605 out of 654 circles of registration and from 14,952 out of 86,360 villages in the province against 617 out of the 654 circles and 13,183 out of the 84,748 villages, respectively, in the previous year.

Smallpox

General prevalence.—Smallpox claimed 9,207 victims in the province in 1931 against 11,268 in 1930. The death rate was 0.2 per mille in 1931 being the same as in 1930, and 0.6 the mean of the previous five years, showing a reduction of 66.7 per cent against the latter, being stationary in the former. Smallpox was responsible for 0.8 per cent of the total provincial mortality against 1.1 per cent in 1930. Two thousand, three hundred and thirty-two villages out of 86,360 were affected with smallpox in 1931 compared with 4,565 in 1930.

Plague

Only one death from plague was reported from Calcutta in 1931.

Fevers

General prevalence.—Deaths from fevers in 1931 amounted to 731,784 against 705,066 in 1930. The death rates were 14.7 for 1931, 15.1 for 1930 and 15.2 during the last quinquennium. The death rate in the year under review was thus reduced by 2.7 per cent compared with the previous year and by 3.3 per cent compared with the quinquennial average. There were slight increases under the following sub-heads (a) enteric fever and (b) relapsing fever. On the other

Causes of deaths

Years	Cholera	Smallpox	Fevers	Dysentery and diarrhoea	Respiratory diseases	Injuries	All other causes	All causes
1931	1.6	0.2	14.7	0.9	1.2	0.4	3.3	22.3
1930	1.2	0.2	15.1	0.8	1.2	0.4	3.4	22.4
Percentage of difference	+ 33.3	±	- 2.7	+ 12.5	±	±	- 3.0	- 0.5

Thus there is an increase in cholera, dysentery and diarrhoea, while there is a diminution in fevers and all other causes. Smallpox, respiratory diseases and injuries remain stationary.

Mortality according to age.—The death rate for every age period was reduced in 1931 compared with that during the previous year except in the case of the periods between (1) 5 to 20 and (2) 40 years and above. In the age period 60 years and above the increase is by 22.9 per cent. In the age period 5 to 10 years the increase amounts to 25.8 per cent.

Provincial infant mortality.—241,552 infants under one year, of whom 129,740 were males and 111,812 females, died in 1931. During 1930, 231,872 infants under one year died, of these 124,212 were males and 107,660 females. The death rates for the two years were 174.0 and 187.3 per 1,000 births, respectively. 21.7 per cent of the total deaths occurred among infants below one year. 57.3 per cent of the total infant mortality was recorded among infants under one month, 26.7 per cent among those between one and

hand there was a decrease under the following sub-heads (a) malaria fever, (b) kala-azar and (c) other fevers. The death rate from measles remained the same as in the previous year. Fevers accounted for 65.7 per cent of the total provincial mortality against 67.5 per cent in the previous year.

Dysentery and diarrhoea

General prevalence.—The total number of deaths reported from dysentery and diarrhoea was 42,764 with a death rate of 0.86 in 1931 against 39,367 and 0.84 in 1930. The death rate was thus increased by 2.4 per cent against 1930 and by 22.8 per cent against the previous quinquennial average (0.7). Twenty-two thousand, five hundred and fifty-four males and 20,210 females died from this cause. Taking these two diseases separately, 24,014 deaths were due to dysentery and 18,750 to diarrhoea, against 22,252 and 17,115, respectively, in 1930, the corresponding ratios being 0.5 and 0.4 in 1931 against the same in 1930. Dysentery and

Analysis of fever deaths in 1930 and 1931

Causes	NUMBER		DEATH RATES PER MILLE		Percentage of increase + or decrease — in 1931	PERCENTAGE OF TOTAL FEVER MORTALITY	
	1930	1931	1930	1931		1930	1931
Malaria fever ..	336,879	349,111	7.2	7.0	— 2.8	47.8	47.7
Enteric fever ..	11,144	12,608	0.24	0.25	+ 4.2	1.6	1.7
Relapsing fever ..	4,767	5,705	0.10	0.11	+ 10.0	0.7	0.8
Measles	2,963	2,954	0.06	0.06	± 0	0.4	0.4
Kala-azar	10,914	10,199	0.23	0.20	— 13.0	1.5	1.4
Other fevers	338,399	351,207	7.3	7.0	— 4.1	48.0	48.0

diarrhoea accounted for 3.84 per cent of total deaths against 3.77 in 1930.

Respiratory diseases

General prevalence.—Respiratory diseases claimed 62,351 victims in 1931 yielding a death rate of 1.24 per mille against 56,082 and 1.20 per mille, respectively, in 1930 showing an increase of 3.3 per cent. The death

question of birth control. The increase in population and child death rate are in all probability no unconnected. (3) The death rate from cholera as compared to 1930 has increased from 1.2 per mille to 1. per mille, i.e., a 33.3 per cent increase.

The value of vital statistics does not lie in the possession of interesting records of past events, but as a guide to future action.

Diseases	NUMBER		DEATH RATES PER MILLE		Percentage of increase + or decrease —	PERCENTAGE OF TOTAL DEATHS FROM RESPIRATORY DISEASES	
	1930	1931	1930	1931		1930	1931
Influenza	3,171	4,714	0.07	0.09	+ 28.6	5.65	7.56
Pneumonia	25,784	27,599	0.55	0.55	± 0	45.98	44.26
Phthisis	11,576	12,238	0.24	0.24	± 0	20.64	19.62
Other respiratory diseases	15,551	17,800	0.33	0.35	+ 6.0	27.73	28.55

rate was higher by 37.8 per cent than the provincial quinquennial average (0.9). The death rate from pneumonia and phthisis remained the same, while other sub-heads showed increases when compared with 1930. 5.60 per cent of total deaths were due to respiratory diseases against 5.37 in 1930.

Part I of the report deals further with the progress made by maternity and child-welfare centres, school hygiene, inspection of school children and vaccination centres. Part II of the report, written by the chief engineer of the public health department, comprises details of expenditure on, and improvement of, water supplies and sewage disposal, etc.

From a general survey of the vital statistics in the report we should like to draw attention to three salient points: (1) The increase in population in Bengal, more marked in some districts than others. The increase is of course not confined to this Presidency alone. (2) The death rate for each life period compared to 1930 is reduced except for those between 5 and 20 and above 40 years of age respectively where an increase is recorded. This increase in the death rate of children and adolescents should impress on all the necessity of child-welfare schemes and, taken along with the increase of population mentioned above, the desirability of the community taking some definite standpoint on the

SEVENTY-FIRST ANNUAL REPORT OF THE GOVERNMENT CINCHONA PLANTATIONS AND FACTORY IN BENGAL FOR THE YEAR 1932-33

General.—The outstanding feature of the year in the quinine market was the sudden drop in price of the commodity from about Rs. 26 to Rs. 19-8 per pound. The fall occurred at a time when currencies were shaken, just before America went off the gold standard, and, while quinine is still linked to gold in the sense that its price fluctuates from day to day with the cost of the precious metal, there is a discernible tendency on the part of those in power in the quinine world to show a more accommodating spirit towards markets where currency has become alienated from gold. The break, coming as it does after years of steadiness, must be all the more welcome to those countries and governments which rely on quinine for the maintenance of a standard of health among their peoples. Looking back it is surprising that the fall did not occur earlier, for quinine has held an almost unique position in a world of falling prices. It may be taken as a mark of confidence in the future of the drug that, with prices of other commodities falling all round, it has maintained its level so long. And this too while the gulf between

New anti-rabic centres were opened at Goalpara, Sibsagar, Golaghat and Hailakandi hospitals. Some private centres for treatment of anti-rabic cases were also started at Lumding (Assam-Bengal Railway) and Dhamai and Mahina tea estates under the supervision of the medical officers at these places.

Yaws.—The campaign against yaws was continued during the year. Two hundred and sixty cases were treated in civil hospitals and dispensaries, against 300 in 1932, while 1,215 cases were treated by the public health staff in charge of dispensaries under that department.

Goitre.—The great prevalence of goitre in the villages situated on the banks of the Dihin river in the Sib-sagar district was brought to notice during the year, and action was taken to institute a survey of the villages situated on the banks of this river. According to McCarrison, the prevalence of goitre along a river is an indication of heavy sewage pollution; and the object of the survey is to ascertain how far up the river the goitre incidence extends, to enable us to say what can be done. Up to date 37 villages have been examined and 938 cases of goitre detected.

The Pasteur Institute and the Assam Medical Research Society.—Government continued to give a grant of Rs. 25,000 to the Assam Medical Research Society. The activities of the society were chiefly confined to malaria, cholera and dysentery. The work on anaemia of pregnancy and pneumonia had to be discontinued for want of funds.

Malaria surveys were carried out in 28 different areas in the province, 19 of which the malaria officer was able to visit in the year. The staff employed by the Research Society on Malaria numbered 51. The expenses were met by contributions from the Assam Government, the Indian Research Fund Association, the Indian Tea Association, the Assam Oil Company, the Assam-Bengal Railway, 5 Municipalities, 4 Local Boards and 3 Town Committees who asked for assistance.

Field experiments on the value of plasmoquine in reducing malaria were carried out. The results of these experiments are still indecisive, and more experimental field work is required to assess the true therapeutic value of this drug. In the plains of Assam where often the vector mosquito incidence is high and their infectivity rate also high, treatment with plasmoquine to reduce gametocyte carriers is of doubtful value owing to constant reinfection. In one area, however, where the mosquito incidence has been reduced, plasmoquine appears to have been of value in reducing the numbers of gametocyte carrier children.

Bacteriophage continued to be used for the treatment and prevention of cholera. Nowgong district, where bacteriophage is systematically distributed to the headmen of villages, had a mortality of 0.036 per 1,000. This is the fourth year in succession in which this district has had no outbreak of cholera. The previous longest period of freedom from cholera since 1906 is 1 year and 9 months in 1920-21.

As mentioned in last year's report a second experiment was undertaken in Habiganj subdivision. By July 1933 bacteriophage had been distributed to every village in Habiganj. The northern half of Habiganj forms part of the delta of the Barak river; the rest of the delta being formed by Sunamganj, North Sylhet and Karimganj. In September cholera broke out in Cachar on the banks of the upper reaches of this river. The infection swept down the valley into the delta. Karimganj had 923 cases with 381 deaths, North Sylhet 955 cases with 493 deaths and Sunamganj 2,586 cases and 1,361 deaths. Habiganj had only 106 cases and 45 deaths. These figures contrast graphically with an exactly similar epidemic in 1927 when Sunamganj had 1,443 deaths and Habiganj 1,500.

Technical researches in the laboratory clearly show that the changes brought about on the cholera vibrio

by bacteriophage go far to explain the results obtained in the prevention and treatment of cholera in the field.

TRIENNIAL REPORT ON THE WORKING OF HOSPITALS AND DISPENSARIES UNDER THE GOVERNMENT OF BENGAL FOR THE YEARS 1929, 1930 AND 1931. BY MAJOR-GENERAL W. V. COPPINGER, C.I.E., D.S.O., M.D., I.M.S., SURGEON-GENERAL WITH THE GOVERNMENT OF BENGAL

Medical education.—This has progressed during this period, teaching up to university standards being given at the Medical College, Calcutta, and Carmichael Medical College, Belgaehia, and the following numbers graduated in medicine in the triennium:—

	Men	Women
1928-29	233	3
1929-30	193	1
1930-31	161	2

the corresponding figures for the membership of the State Medical Faculty being 1928-29 6 men, 1929-30 11 men, and 1930-31 8 men, no woman taking this qualification.

This diminution in numbers was probably partly due to the increasing difficulty of the course and also to economic conditions.

The similar figures for the State Medical Faculty licence are as follows:—

	Men	Women
1928-29	309	5
1929-30	306	2
1930-31	411	2

and the membership figures follow these closely.

The diplomas in Tropical Medicine and in Public Health continue popular.

An important change has been the introduction of inspection of the schools and examinations of the State Medical Faculty by a committee of the Bengal Council of Medical Registration. This has led to an improvement in the teaching of the schools and the methods of examination and should tend to equalize standards all round by improving those in the weaker schools. The principle has been recognized by the Calcutta University, but is not carried into effect.

A marked feature of the triennium has been a falling off of the number of qualified candidates entering the Medical Colleges. This is due probably to the prevailing economic distress, the lengthening and greater cost of the medical course and its recognition by parents and the diminishing emoluments of those who qualify, and this applies to a good deal of India. There has been a good deal of agitation throughout India and especially in Bengal for the raising and stiffening up of the licentiate course and standards towards that of the university so as to maintain a single register for licentiates, members and graduates. This is generally recognized as very desirable, but the cost both to parents and schools of the extra time and money required renders this change practically impossible in these times of financial stringency, as it has been found that the introduction of even small changes in the teaching of chemistry for the licentiate students has been impossible to give effect to, on account of the expense involved in the improved practical work.

Much, however, has been done to improve the facilities for post-graduate study. In addition to the teaching provided at the School of Tropical Medicine both in Public Health and Tropical Diseases, post-graduate facilities are now available at the Medical College Hospitals for work in almost every branch of medicine by the introduction of a system of Clinical Assistants and House Officers.

School of Tropical Medicine and Hygiene, Calcutta.—The high reputation of this school as a research and

also as a teaching institution was maintained throughout the triennium. The institution attracted a larger number of candidates from the different parts of the country, viz, 321 against 254, during the previous triennium. The candidates trained during the period under report were as follows:—

1928-29	..	..	..	102
1929-30	..	..	..	112
1930-31	..	..	..	107

The number of students who passed out of the school during the last three years is also shown below:—

	1928-29	1929-30	1930-31
D. T. M.	.. 34	30	30
D. P. H.	.. 12	14	17
L. T. M.	.. 24	39	35
TOTAL	.. 70	83	82

Diseases—Cholera.—The disease prevailed in the town in a mild form throughout the triennium, there having been 3,735, 2,772 and 2,427 attendances with 801, 489 and 464 deaths in 1929, 1930 and 1931, respectively, in comparison with 2,208, 3,269 and 3,855 cases with 480, 717 and 860 deaths in 1926, 1927 and 1928, respectively. These show a steady decrease in the incidence of cholera cases in the Calcutta hospitals. As usual, the Campbell Hospital, which has the greatest amount of accommodation for cholera cases, maintained its high reputation for treatment and recorded the largest number of attendance of patients, viz, an average of 1,765 as compared with 3,110 patients in the preceding triennium.

Kala-azar.—Formerly kala-azar cases were difficult of diagnosis, but with the advent of improved methods of investigation and the modern method of treatment the disease is now under control. The newer antimony preparations for kala-azar appear definitely to have a greater value in curing of the disease than the older. It is very satisfactory to note that the disease is steadily decreasing year by year. In the Calcutta hospitals 10,640 patients were treated in 1929, 6,922 in 1930 and 6,322 in 1931, total 23,884, as compared with 35,443 patients in the previous triennium. The Medical College group of hospitals afforded treatment to the largest number of patients, viz, 3,840 in 1929, and 1,931 in 1930, while the Campbell Hospital showed the largest in 1931, viz, 1,364. The Carmichael Medical College Hospital, Belgachia, treated only 1,086 cases in 1929, 401 in 1930 and 208 in 1931.

Malaria.—The total number of malaria cases during the triennium was 167,500 against 162,078 in the preceding triennium, an increase of 5,422. Most of the patients were dealt with in the Medical College Hospitals in 1929, while Taltola Municipal dispensary treated the largest number in 1930 and Sree Vishudhanda Saraswati Marwari Hospital in 1931. The total number of deaths was 250 against 244 in the previous triennium.

Plague.—The town of Calcutta was practically free from plague, only two cases occurred during the triennium, viz, one case was recorded as out-patient in the Ultadanga Municipal dispensary in 1929 and another in the Lady Dufferin Victoria Hospital in 1930. The Howrah General Hospital also treated two cases of plague during the year 1931.

Smallpox.—This disease may be said to have prevailed in a rather milder form during the triennium under report as compared with the previous triennium. In 1929 altogether 269 patients were treated with 41 deaths in the Calcutta hospitals. In 1930, 616 cases with 203 deaths and in 1931, 501 with 140 deaths, a total of 1,386 cases as compared with 2,496 in the preceding triennium.

The Campbell Hospital is the only smallpox hospital in Calcutta where in-door patients are treated and has

got separate and adequate accommodation for the treatment of such patients. It has treated the largest number during the triennium, viz, 188 in 1929, 514 in 1930 and 404 in 1931. Most of the persons suffering from this disease do not come to hospital for treatment but prefer to remain at their homes and get themselves treated by private practitioners.

Influenza.—The number of influenza cases steadily increased during the triennium. In 1929, 1930 and 1931, 18,321, 20,263 and 25,733 patients, respectively, were treated as compared with 10,207, 15,069 and 15,683 in 1926, 1927 and 1928, respectively. Deaths from this disease were comparatively small in number, viz, a total of 181 as compared with a total of 366 in the previous triennium.

Tuberculosis of the lungs.—The total number of patients treated in the Calcutta hospitals from this disease was 6,062 in 1929, 7,318 in 1930 and 8,525 in 1931, or a total of 21,905 as compared with 4,117, 6,358 and 6,200, or a total of 16,675 in the previous triennium. The figures show that there was an increase of 5,230 patients in the triennium under report.

Veneral diseases.—The total number of patients treated for all sorts of venereal diseases was 82,260 in the triennium under review; of this 59,866 were males and 22,394 females against a total number of 75,615 patients (51,965 males and 23,650 females) in the preceding triennium. Of the total number 33,514 patients (24,633 males and 8,881 females) were treated for gonococcal infection, 33,486 patients (24,268 males and 9,218 females) for syphilis and 15,260 (10,965 males and 4,295 females) for other diseases of venereal origin.

Epidemic dropsy.—The prevalence of this disease was markedly increased in 1929 and 2,788 cases were treated in the Calcutta hospitals during the year alone against 1,055 in 1928. Most of the cases are associated with the use of badly stored rice and other adulterated articles of food. In 1930 the disease was somewhat of a milder type and 1,454 cases were admitted in the hospitals. The number in 1931 again rose to 1,854.

In the in-door department a total of 276 cases was treated in the triennium. The incidence of death was, however, not much, it being only 29 against 217 in the preceding triennium.

Diphtheria.—A separate arrangement for the treatment of diphtheria cases exists only in the Medical College Hospitals. A small block is situated on the roof of the main building of the Medical College Hospitals where accommodation for 10 beds exists, viz, 8 for children and 2 for adult females. There is a small operation theatre for the relief of urgent dyspnoea. Scrum is always kept in sufficient quantity in the ward, in an ice chamber owing to the effect of excessive heat of tropical climate. The total number of cases treated was 190 in 1929, 223 in 1930 and 213 in 1931. The total number of tracheotomy operations performed was 76 in 1929, 68 in 1930 and 100 in 1931. Out of 213 cases in 1931, 73 died, i.e., a mortality of 34.2 per cent, which is higher than the mortality rate of the two previous years, viz, 23.3 per cent in 1930 and 26.3 per cent in 1929. The high mortality in the year 1931 was due to the fact that a large number of cases were brought very late with urgent dyspnoea and on no less than 100 cases tracheotomy had to be performed. The death rate in tracheotomy cases is always higher than that of the cases treated without this.

Hospitals for the treatment of leprosy.—There are only three asylums for the treatment of lepers in Bengal, viz, (1) the Albert Victor Hospital for the Treatment of Leprosy, Gobra, Calcutta, (2) Raniganj Leper Hospital in the Burdwan district and (3) the Bankura Leper Hospital.

The first is maintained by Government and the latter two are under the management of the Mission to Lepers, maintained by their funds and subscriptions with Government aid.

The number of beds and of patients treated in the three hospitals during the triennium under report is separately shown in the table below:—

	1929		1930		1931	
	Number of beds	In-door patients	Number of beds	In-door patients	Number of beds	In-door patients
Gobra ..	181	359	181	400	181	382
Raniganj ..	182	239	174	195	174	193
Bankura ..	226	239	226	240	226	243
TOTAL ..	589	837	581	835	581	818

Malaria.—As in the previous triennium this disease accounted for the largest number of patients treated, viz, 7,196,318 as compared with 6,167,877 during the previous triennium—an increase of 1,028,441. The figures for the individual years are 2,227,502 in 1929, 2,271,740 in 1930 and 2,697,076 in 1931. The incidence of death was 863 among the in-patients against 866 in the previous triennium.

Kala-azar.—The total number of patients treated for this disease was 179,202 as compared with a total of 246,981 during the previous triennium—a decrease of 67,779. The figures for each individual year were 64,066 in 1929, 55,053 in 1930 and 60,083 in 1931. There was a total of 696 deaths among the in-patients treated for this disease.

Cholera.—The outbreak of cholera in the triennium under report seems to be of a mild character. The total number of patients treated for this disease was 31,252 against 47,972 in the previous triennium. The mortality amongst the in-patients was also lower, viz, 1,156 against a total of 1,538 in the triennium ending 1928.

Smallpox.—As compared with the previous years smallpox appears to have been less prevalent. There was a total of 2,137 cases against 4,291 in the previous triennium. There were altogether 113 deaths from this disease during the triennium under report.

Influenza.—The total number of patients treated for this disease was 390,313 as compared with a total of 256,551 during the previous triennium—an increase of 133,762. In 1929, 93,780 patients were treated and the number increased rapidly to 119,780 in 1930 and to 176,753 in 1931. The type of the disease, however, does not appear to be severe as the death rate was very small, viz, a total of 180 during the triennium under report.

Epidemic dropsy.—There had been a steady decline in admission and attendances for this disease in the mofussil hospitals and dispensaries, the numbers being 6,101, 3,469 and 1,349 for 1929, 1930 and 1931, respectively.

Tuberculosis of the lungs.—The total number of patients treated for this disease during the triennium under report was 34,233 as compared with 28,428 during the previous triennium. The figures for the individual years indicate a gradual annual increase in attendance and admission for this disease, and this has been the condition for the last several years. The prevalence of this disease is thus very apparent.

Mention may here be made of the Tuberculosis Hospital at Jadabpur in the 24-Parganas district under the auspices of the Calcutta Medical Aid and Research Society. The institution made improvements in its buildings, equipment and in its working during this triennium. At the end of the period under report there were 45 beds, viz, 33 for males and 12 for

females, for the accommodation of tuberculous patients and in all there were 27 patients treated in 1929, the same number in 1930 and 114 patients in 1931. Excluding the opening balance, the total receipts of the institution was Rs. 2,22,853 during the triennium, of which Government contributed Rs. 1,00,000 in 1929 and the Calcutta Corporation Rs. 55,000 in 1931. The expenditure during the triennial period was Rs. 2,15,817.

Veneral diseases.—The total number of patients treated for venereal diseases was 218,363 as compared with 235,288 during the previous triennium. Of gonococcal infections, the total was 112,594 against 119,607, and the number of patients treated for syphilis was 73,499 against 79,906 during the previous triennium. Other diseases of venereal origin accounted for 32,270 cases as compared with 35,775 during the previous triennium. The number of deaths occurring among the in-patients treated for these diseases was 130 against 120 during the three years 1926-28.

Leprosy.—Apart from cases treated in the special hospitals for the treatment of this disease, the total number of patients treated in the mofussil hospitals and dispensaries was 8,907 as compared with 6,831 during the previous triennium. The figures for individual years were 2,815 in 1929, 2,867 in 1930 and 3,225 in 1931.

General remarks.—This has been a period of much difficulty in this as in other departments, the continuance of the period of financial stringency, with the extensive changes in organization necessitated by the approaching changes in methods of Government, and the economic and political disturbances of this period, have rendered work exceptionally difficult. There has been nearly a breakdown in our nursing services in the larger hospitals in connection with the shortage of the usual contributions for their upkeep, and the officers in charge of the larger hospitals have had great difficulty in arranging for adequate dieting and ordinary consumable medical and surgical supplies during the period and have managed to curtail expenditure under these heads without seriously interfering with the comfort and treatment of the patients in their charge, though this has involved a great deal of extra labour. Buying supplies of all kinds on a large scale and locally has been extensively introduced and with good effect, but the indents for new equipment, especially for surgery, have had to be reduced. The new wing of the Eden Hospital, though ready for occupation, could not be opened up to date on account of the extra expenditure involved and the partial and temporary closure of beds in certain hospitals had to be seriously considered. The system of charging fees for patients who could afford to pay has been considered, and steps are being gradually taken to introduce this system where possible. It is already in existence in some of our hospitals, notably the Presidency General Hospital for most of its beds, and the District Board of Nadia has introduced this system in the dispensaries under it with considerable success. The records and figures in the early part of this report will show the great increase in popularity of our hospitals and the increased attendance, and I have no doubt that the next triennium will show a larger increase owing to improvements now in progress in our out-door departments, especially in Calcutta.

There has been a great increase in demand for electrical and x-ray treatment during this triennium partly due to new methods and partly due to the provision of more facilities and the popular appreciation of their utility. This and some of the newer methods of treatment, especially the more extensive use of sera and vitamin preparations, have proved very expensive and have thrown a heavy load on our financial resources.

Two new medical schools have been opened during this period and will, I hope, prove a success. Much interest is being taken in them locally and efforts are being made to improve the hospitals on which they are based. The inspecting committee of the State Medical Faculty has been a great help to me in matters connected with the medical schools by their advice and helpful criticism.

Correspondence

ATROPINE IN STRANGULATED HERNIA

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR,—The following case may interest some of your readers.

H. B., a Mohammedan male, aged about 60 years, was brought to this hospital with a strangulated inguinal hernia of the left side at 7-30 p.m. on the 10th June, 1934. The duration of this condition was about five hours; the patient was in severe pain; his temperature was normal and pulse 68 per minute; he was constipated. The serotal swelling was irreducible, hard, tense and tender with no impulse on coughing; it was of elongated shape, measuring ten inches by six inches. The patient had been suffering from chronic bronchitis.

Ice was applied to the swelling and atropine sulphate, 1/50th of a grain, was injected subcutaneously; within forty minutes the hernia slipped in on slight manipulation with immediate relief to the patient.

Yours, etc.,

H. L. MUKERJEE,
Resident Sub-Assistant Surgeon.

E. B. RAILWAY HOSPITAL,
LALMONIRHAT,
18th June, 1934.

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR,—I shall be very glad if you will kindly publish the following few lines in your esteemed journal:—

P. C. D., a Hindu male, aged 55 years, while passing along the street in front of the Astanga Aurved Hospital, suddenly felt severe pain in the right inguinal region. He was brought into this hospital for treatment. On examination, I found the patient suffering from strangulated right inguinal hernia. The swelling in the serotum was very tense and did not yield to taxis. The patient was in extreme distress and perspiring profusely. The patient was questioned closely, but he never admitted of having ever suffered from hernia.

I remembered having read in the *Indian Medical Gazette* that atropine had been used with good results on two similar cases. I injected atropine 1/100th of a grain and applied ice over the part.

Within twenty-five minutes' time, without any sort of manipulation on my part externally, the whole of the descended gut returned to the abdominal cavity, and the patient was thus relieved promptly.

I am grateful to Dr. D. P. Ghosh, B.A., M.B., for permission to publish the notes of this case.

Yours, etc.,

AMAL CHANDRA DEY, I.M.F. (Cal.),
Senior Assistant Medical Officer
and Pathologist.

ASTANGA AURVED
MEDICAL COLLEGE HOSPITAL,
CALCUTTA,
21st July, 1934.

THE MICA MYTH IN DARJEELING WATER

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR,—There is an impression amongst the visitors to Darjeeling that the water supplies contain mica, and it is sometimes suggested that mica in the drinking water causes irritation of the intestinal mucosa, with resultant diarrhoea. The water supply of Darjeeling is obtained from a number of perennial springs on the western slope of the Senchal range. The springs connect with a closed concrete conduit and deliver into

a reservoir known as 'Senchal Lake'. A glance at a geological map of the Darjeeling Hill Territory shows that the western portion of the Darjeeling District, including the Senchal range, is constituted by gneiss. 'The gneiss of the Darjeeling District is of the foliated type, apparently a true gneiss composed of translucent colourless quartz, opaque white felspar and dark brown and silvery mica, varying in texture from fine-grained to moderately coarse. The gneiss frequently passes into mica-schist or feldspathic mica-schist, bands of quartzite are rare, while hornblendic rocks are extremely uncommon'. It may be noted that quartz is pure silica. Felspar consists of the silicates of aluminium with either sodium, potassium or calcium and rarely barium. The micas are silicates, and in most cases orthosilicates, of aluminium with potassium and hydrogen, also often magnesium, iron, sodium and lithium, and they have the characteristic micaceous structure; muscovite, the most common of the micas, is an essential constituent of mica-schist and related rocks and is a prominent component of certain common varieties of granite and gneiss. As the water passes through these materials, it does not, as a rule, carry them in solution or suspension. The 'mica theory' in Darjeeling water seems to have been based only on surmise—as the water passes through micaceous soil, it must take up mica particles'. It is not known if anybody has ever detected mica in the water. In fact, the water from the lake or springs is clear and sparkling. There is practically no suspended matter or irritating substance. The total solids (that is, the total substances of every kind which are left behind when the water is evaporated to dryness), total hardness and chlorine, respectively, amount to 3-4, 1.0 and 0.4 parts per 100,000 parts of water. The water is of a high degree of purity, both chemically and bacteriologically. Thus, the presence of mica is not suspected from the general characteristics of the water supplies. Nevertheless, with a view to finding out if there was any truth in the 'mica theory' in Darjeeling water supplies, the writer of this article carried out the examination of the water in all possible ways while he was employed as chemist to the Darjeeling Municipality, but mica could not be detected. At last the matter was referred to Sir E. H. Pascoe, the then Director of the Geological Survey of India, and two samples of residues, obtained in one case by the evaporation of 1,000 c.cm. of the lake water and in the other by the evaporation of 1,000 c.cm. of the mixed spring water before its entrance into the lake, were sent to him for examination. In his letter No. 1569/23 of the 29th March, 1926, he stated as follows:—

'The residues are extremely fine, but even under a high power nothing could be detected which appear to be mica..... I know of no better test for mica in water than a microscopical examination of the residues on evaporation'.

Yours, etc.,

NISHI KANTA RAY, B.A.,
Bacteriologist.

VACCINE LABORATORY,
PUBLIC HEALTH DEPARTMENT,
BENGAL, CALCUTTA.

[Note.—The letter is of special interest in view of the fact that an investigation into the cause of 'hill diarrhoea' in Darjeeling is at present in progress. The question of mica in the water is of course being considered.

Our correspondent does not state at what time of the year he carried out his investigation but from the date of Sir E. H. Pascoe's letter we gather that the residues he examined were from water he collected during the cold weather, a time of the year when diarrhoea is not epidemic.

Our correspondent's observations are in keeping with the findings in the present investigation on 'hill diarrhoea', but they cannot be considered as closing the discussion on the subject.—Editor, I.M.G.]

THERAPEUTIC PROPERTY OF COCONUT OIL

To the Editor, THE INDIAN MEDICAL GAZETTE

Sir,—Coconut is known in India as having a high nutritional value. Hindus use it in culinary preparation in the form of coconut milk or coconut oil.

One of us noted it having been given in the form of coconut milk in Indian homes for aphthous patches.

This suggested to us that it might contain one or more vitamins, and we used pure neutral coconut oil in the form of injections in the following conditions: cachexia, beri-beri, burning of feet, sprue, dermatosis, xerophthalmia, hemianopia. All these patients have tolerated perfectly and shown signs of improvement.

We give intramuscular or hypodermic injections, 5 c.cm. every day, or every alternate day; or intravenous injections, 1 to 2 c.cm. every alternate day up to 15 injections.

We are continuing the trials on a big scale and hope to give the result later, but we send this preliminary note to have it registered.

Yours, etc.,
E. GAFFIERO.
Z. ANDRE.

PONDICHERY.

[Note.—The intravenous injection of oil is a very unusual procedure and one that is likely to be followed by oil embolism. This statement should therefore be accepted with reserve.—Editor, I.M.G.]

Service Notes

APPOINTMENTS AND TRANSFERS

MAJOR-GENERAL H. R. NUTT, V.H.S., is appointed Honorary Surgeon to the King, 28th February, 1934, vice Major-General Sir J. D. Graham, Kt., C.B., C.I.E., retired.

The services of Major M. Taylor, Officiating Superintendent, Central Mental Hospital, Yeravda, are replaced at the disposal of the Government of Bihar and Orissa, with effect from the afternoon of the 20th June, 1934.

The services of Major G. D. Malhoutra are placed at the disposal of the Government of Bihar and Orissa for employment in the Jail Department, with effect from the 22nd June, 1934.

The services of Major D. R. Thomas, O.B.E., Officiating Imperial Serologist, Calcutta, are replaced at the disposal of the Government of the Punjab, with effect from the date on which he relinquishes charge of his duties.

Major S. D. S. Greval, an Officer of the Medical Research Department, is appointed to officiate as Imperial Serologist, Calcutta, with effect from the date on which he assumes charge of his duties.

Major W. E. R. Dimond, Assistant Director, Public Health, North-West Frontier Province, is appointed to officiate as Inspector-General of Civil Hospitals, North-West Frontier Province, during the absence on leave of Colonel C. I. Brierley, C.I.E.

The services of Major J. R. Katariya are placed at the disposal of the Government of Bengal for employment in the Bengal Jail Department, with effect from the date of his assuming charge of his duties.

Major S. R. Prall is appointed to be Superintendent, St. George's Hospital, Bombay.

Major T. A. Doran is appointed to officiate as Resident Medical Officer, St. George's Hospital, Bombay, with effect from the 11th June, 1934.

The services of Captain G. J. Joyce are placed temporarily at the disposal of the Government of the Punjab, with effect from the 18th June, 1934.

The services of Captain E. A. O'Connor are placed temporarily at the disposal of the Government of Bihar and Orissa, with effect from the 2nd July, 1934.

The services of Captain P. J. Kelly are placed temporarily at the disposal of the Government of Madras, with effect from the 8th July, 1934.

Subject to His Majesty's approval, the under-mentioned officers, whose appointment on probation was notified in February 1932 and March 1933, are confirmed on completion of one year's satisfactory service:—

Major

B. R. Tandon.

Captains

P. V. Karamechandani.

D. P. Mitra.

R. K. Misra.

T. D. Ahmad.

K. R. Sahgal.

M. Jafar.

M. S. Gupta.

A. M. Chaudhuri.

A. N. Chopra.

P. V. Bamford.

D. N. Chakravarti.

H. D. R. Zscherpel.

S. Annaswami.

K. Jilani.

T. B. Pahlajani.

J. R. Dogra.

Asa Singh.

S. Narain.

R. R. Bakshi.

F. M. Khan.

B. D. Khurana.

D. Datt.

D. C. Chopra.

M. G. Saincher.

Jaswant Singh.

B. L. Taneja.

Saugham Lal.

S. W. H. Askari.

A. K. Gupta.

Hoe Min Sein.

V. Srinivasan.

D. P. Nath.

H. H. Mahmood.

Subject to His Majesty's approval, the under-mentioned officers, whose appointment on probation was notified in June 1933 and September 1933, are confirmed on completion of one year's satisfactory service:—

Captains

B. M. Rao.

C. H. Dhala.

A. N. Duggal.

M. Ata-Ullah.

B. S. Sandhu.

S. Ahmad.

B. N. Khan.

C. C. Kapila.

I. Baksh.

V. M. Albuquerque.

LEAVE

Colonel C. I. Brierley, C.I.E., Inspector-General of Civil Hospitals, North-West Frontier Province, is granted leave for 1 month and 29 days, with effect from the 24th July, 1934.

PROMOTIONS

Majors to be Lieutenant-Colonels

P. C. Banerjee. Dated 2nd June, 1934.

B. Prasad. Dated 2nd June, 1934.

A. N. Bose, M.B.E. Dated 8th June, 1934.

J. M. Mitchell, O.B.E. Dated 13th June, 1934.

M. G. Bhandari. Dated 14th June, 1934.

N. J. Gai. Dated 20th June, 1934.

M. M. Cruickshank. Dated 28th June, 1934.

Previous notification of June 1934 in so far as it relates to the promotion of Lieutenant (on probation) W. M. E. Anderson to the rank of Captain (on probation) is cancelled.

RETIREMENTS

Lieutenant-Colonel K. S. Singh. Dated 21st June, 1934.

Lieutenant-Colonel V. N. Whitmore, O.B.E. Dated 7th June, 1934.

DISTINGUISHED SERVICE

The names of the undermentioned have been brought to notice by His Excellency Field-Marshal Sir Philip W. Chetwode, Bt., G.C.B., K.C.M.G., D.S.O., Commander-in-Chief in India, for distinguished services rendered in connection with the military operations against the Upper Mohmands, period 28th July to 3rd October, 1933:—

Colonel E. W. C. Bradfield, C.I.E., O.B.E. (Edin.), V.H.S., Assistant Director of Medical Services, Peshawar District.

Major D. V. O'Malley, O.B.E.

Captain S. D. Dalal.

Lieutenant J. O'Neill.

Notes

A NEW INTRA-UTERINE CANNULA

ANYONE who has injected mercurochrome-glycerine into the uterus for septic conditions must have experienced certain difficulties in keeping the medicament in the cavity for any length of time. Injecting the solution with an ordinary rubber catheter or long metal tube and removing it immediately afterwards allows the liquid to drain away, especially when the cervix is not closed. This cannula, which is made in three different sizes to suit individual cases, has a small trap-door, which opens one way only. A long intra-uterine metal tube fixed to an ordinary 20 c.cm.



Cannula.

Trap-door closed.



Trap-door open.

Long metal pipe.

'Record' syringe is passed through this cannula into the uterine cavity, the solution is injected, and the tube removed allowing the trap-door to close. The cannula with the trap-door closed prevents fluid escaping from the cervix and can be allowed to remain as long as necessary. Messrs. N. Powell and Company have made this instrument for Dr. J. R. Parakh, Bombay.

FRACTURE BEDS AND FRACTURE TABLES

MESSRS. MALGHAM BROTHERS of 26, Custom House, Fort, Bombay, have asked us to announce that they can supply both Hawley-Scanlan fracture x-ray and orthopaedic tables, and also Lawson Tait fracture beds, to which reference was made in an article on fracture equipment that appeared in our January and March numbers.

They have also asked us to say that they are prepared to supply to a few surgeons a detailed booklet describing the Hawley-Scanlan table.

AN IDEAL INFANT FOOD

THE amazing strides that have been made in recent years in the production of infant foods is exemplified by the one well-known in practically every household in India—namely Glaxo. The proprietors of this food, in every step they have taken in reaching the magnificent reputation that Glaxo to-day enjoys have shown extraordinary scientific foresight and initiative.

This commenced when they chose New Zealand as the venue of their milk supply, for in that country the dairy herds are of the Jersey and Guernsey strains, so famous for the quality of the milk they provide. In addition, New Zealand is the only milk-producing country in the world where the cattle graze in pasture land the whole of the year round and stall feeding, which affects adversely the quality of the milk, is unknown.

Moreover, the Government of New Zealand has tackled the problem of bovine tuberculosis in a manner that sets an example to most of even the European countries.

It was the Ministry of Food in England that were the first 'official' users of Glaxo, and during the War their first order for it, to be used for the feeding of infants in England, was for 600 tons.

Then came the intense work of vitamin research which still proceeds, but which commenced in real earnest and on an international scale just after the War. In this work, the scientists of the staff of 'Glaxo' have played an important part, and in that important publication 'Vitamins—A Review of present Day Knowledge', published by the Medical Research Council not long ago, four of the contributors were members of the Glaxo staff. But one of the many

independent research workers—namely, Katherine Coward—had shown that raw cow's milk contains practically no vitamin D, and the findings of her work, which resulted in this conclusion, were published or quoted in a number of reputable scientific journals.

It is a corollary, therefore, that a food made from milk can be no more rich in vitamin D than the milk itself if the latter is deficient in such an important constituent.

Moreover, the Ministry of Health some 18 months ago drew the attention of the infant-welfare bodies under their jurisdiction to a great improvement that could be made to the diet of infants for the prevention of infantile anaemia, and recommended a method of modification.

In the commencement of this article, the remark has been made that the proprietors of Glaxo had shown remarkable scientific foresight and initiative, and in support of this, it is interesting to observe that long before either the findings of Katherine Coward were published, or the statement of the Ministry of Health was made, the manufacturers of Glaxo had made the addition of vitamin D, and the modification for the prevention of infantile anaemia that had been recommended.

Furthermore, insofar as the supply of Glaxo destined for the Indian market is concerned, the packing of it is carried out in air-conditioned surroundings—that means to say, the air which enters the packing room is washed and purified before it enters. In addition, all Glaxo coming to this country, which it does direct from New Zealand, is placed in cold storage immediately on arrival, and users of this food have probably observed upon opening a tin, a degree of freshness which, if they were able to compare the contents with powder immediately after manufacture, they would find identical.

The rigidity of bacteriological and scientific control, throughout the stages of its manufacture, the skill employed in the perfecting of it, the scrupulous care that is being taken to retain its freshness, make Glaxo

the ideal infant food for India, and especially does this apply during the hot weather and monsoon months when infantile diarrhoea plays such havoc with the health of infants.

THE VELOX SPUTUM MUG AND FLASK STERILIZER

For many years it has been the practice in sanatoria and hospitals in dealing with sputum mugs and flasks to pour the contents down the drain and then boil the vessel. The method was crude and is certainly open to certain objections, but it was the only method available and was therefore accepted.

It is now no longer necessary to take up this defeatist attitude as an appliance has been placed on the market that makes it easier to carry out the proper disinfection of these receptacles than it was to go through the old performance that was often little better than 'eye-wash'.

The mugs or flasks with their contents are brought along in a wire tray supplied with the Velox sterilizer; the mugs are then placed inside the machine in an inverted position, and the sputum falls into the water in the water space; the tray is then placed over these mugs, the cover screwed down, and steam turned on. The steam causes the water to scour the mugs inside and outside and while doing so the steam pressure rises to 15 pounds per square inch and sterilizes the mugs, tray and sputum. Some air is present in the sterilizer at the commencement of the operation; this air is expelled through a special air filter attached to the machine. The sputum, lying in the lower portion of the sterilizer, is now sterile and disintegrated. The cock below the machine is now opened and this disintegrated sputum is ejected into the drain under pressure.

The sterilizer is opened, mugs or flasks are found to be clean and sterilized, and the operation is repeated on the next set of mugs or flasks.

Simple in design, active and effective in result, this sterilizer should have its place in all sanatoria.

Upon the same principle this company have designed a bedpan sterilizer which is just as effective.

Messrs. Balmer Lawrie and Company, Limited, of 103, Clive Street, Calcutta, and 5, Graham Road, Ballard Estate, Bombay, are the sole Indian agents for the Grampian Engineering Company, Limited, Stirling, Scotland, the manufacturers of Velox plant.

Further particulars on page lx.

GONEAL

This preparation is a silver and calcium caseinate which is said to give excellent results in the treatment of the complications of gonorrhoea, such as arthritis, epididymitis and prostatitis. The action is mainly one of protein shock—or protein therapy as it is now more euphemistically called, but the presence of silver adds a specific element to the compound.

In the complications we have mentioned, the intramuscular injection of Goneal exercises the same resolving action which is produced by specific vaccines. A hyperæmic and inflammatory reaction is produced in the diseased tissues, and this, without doubt, is one of the principal elements in the therapeutic effect of both protein and vaccine treatment. But Goneal, for its special constitution and composition, has the advantage of being more exactly dosable, of being very well tolerated, as it does not cause the violent reaction which follow vaccine treatment, and finally its therapeutic action is more rapid and more complete.

Dosage.—Goneal should be administered by deep injection in the gluteal muscles. Injections are generally given on alternate days. Usually one box is more than sufficient for one course of treatment. Injections do not produce general reaction worth

mentioning, so that Goneal treatment may be carried out with the greatest confidence.

It is a product of the National Opothropic Institute of Pisa and has been tested in the medical clinic of the Royal University of Turin from where very satisfactory results are reported.

RHEUMATISM

INFLAMMATORY conditions are by no means confined to the winter months, and rheumatism does not govern itself by the calendar. So Antiphlogistine is an all-year therapeutic agent, indicated for and often affording the most grateful relief in the treatment of articular and non-articular rheumatism.

The moist heat which it maintains for more than 12 hours, reinforced by the osmotic and phagocytic actions of its chemical constituents, tends to improve the local metabolism, promote absorption of the swellings in and around the muscular fibres, helps to restore movement in stiffened joints and muscles and to bring relief from the pain.

Antiphlogistine is indicated for the majority of inflammatory lesions, whether deep-seated or local and those physicians who are not conversant with its uses, or who may wish to give it further clinical trial, are invited to write for samples and literature. The Denver Chemical Mfg. Co., 163, Varick Street, New York, U. S. A.

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Original Articles

LATENT MALARIA INFECTION IN MONKEYS

By R. KNOWLES

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Professor of Protozoology
and

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Assistant Professor of Protozoology, Calcutta School of
Tropical Medicine

Introduction

It may be recalled that Napier and Campbell (1932) discovered a *Plasmodium* infection in a 'Singapore' monkey—at first wrongly identified (by zoological authorities) as *Cercopithecus pygerythrus*, but subsequently shown to be *Silenus (Macacus) irus*—which produced severe and fatal malaria, often accompanied by hæmoglobinuria, on passage into *Silenus (Macacus) rhesus*, the common monkey of Bengal. This parasite was intensively studied by Knowles and Das Gupta (1932), who passaged the strain into *Silenus rhesus*, *Silenus radiatus*, *Semnopithecus entellus*, *Hylobates hoolock*, and also into three human volunteers, who contracted monkey malaria, the infection being a very severe one in one of these volunteers. These workers were extremely puzzled by the great variations in morphology, associated with varying grades of severity of symptoms, in the different hosts used; thus, typically, the infection in *S. irus* morphologically and clinically resembled one with *Plasmodium vivax* in man, whilst the infection in *S. rhesus* clinically resembled one with malignant tertian malaria in man, and the parasites morphologically resembled *P. falciparum* (except that the gametocytes were spherical and not crescentic in shape and that the hæmozoin was in loose granules and not jet black).

Subsequently to this the strain was sent to Lieut.-Colonel J. A. Sinton, v.c., I.M.S., Director, Malaria Survey of India, and, in a series of papers covering and reviewing the whole subject of monkey malaria, and including a tremendous amount of original investigation, Sinton and Mulligan (1932, 1933) established the fact that the original strain seen in *Silenus irus* at the Calcutta School of Tropical Medicine, must have been a mixed one with two species of monkey plasmodium. At first we were incredulous of this finding, since the naturally-infected monkey first discovered had shown only an extremely scanty infection, but a thorough study of Sinton and Mulligan's papers, a study of a pure-line strain of *Plasmodium inui* var. *cynomolgi* which Colonel Sinton was kind enough to send us, and subsequent work at the School has convinced us that these authors are right and that we were, in actual fact, dealing with a mixed strain.

As the subject of monkey malaria is now being studied so widely, we may perhaps here give a brief synopsis of the two species of parasite concerned, taken from Sinton and Mulligan (1933), and our own work:—

Plasmodium inui var. *cynomolgi* Mayer, 1907.

Natural host, *Silenus irus*. Reported from Malaya and Java. The young rings are from one-fifth to one-third of the diameter of the infected red corpuscles; are usually thin and hair-like. An accessory chromatin dot is frequently present in the ring stage. Slightly older forms are often very irregular.

The growing trophozoite forms lie in corpuscles which are enlarged, often pale, and which show Schüffner's dots in abundance. These appear early and are constant in appearance. The trophozoites are very amoeboid; the vacuole is at first well developed, but is usually not seen in the segmenting forms. Pigment appears relatively late, is golden brown in colour, and the granules are fine.

The mature schizont-rosettes lie in enlarged red corpuscles which show Schüffner's dots. The merozoites number about 16. The duration of the schizogony cycle is 48 hours.

The gametocytes resemble those of *P. vivax*, and lie in enlarged red corpuscles showing Schüffner's dots. The pigment is not very abundant.

The infection is readily transmissible to mosquitoes. The infection in *S. irus* is benign and chronic in character, with little accompaniment of illness; it may persist for months. When passaged into *S. rhesus* the infection takes readily, but is mild in character, often however prolonged; the infected monkeys all recover spontaneously.

In splenectomized *S. irus* the infection is mild, with recovery.

Plasmodium knowlesi Sinton and Mulligan, 1932.

Natural host, *Silenus irus*. Reported from Malaya.

The young rings are from one-third to one-half the diameter of the infected red corpuscles; the chromatin in the ring is generally dot-like or blob-like and well in evidence; it often occurs as a small curved bar resembling the similar appearance in *P. falciparum*. An accessory chromatin dot is often present. Early division of the chromatin and multiple infection of the red corpuscles are very marked features at this stage (in *S. rhesus*). Slightly older forms occur as rings with a more solid appearance.

The growing trophozoite forms lie in red corpuscles which show no trace of enlargement, which are not pale, and which show no stippling (with the usual stains). The infected corpuscles are frequently distorted—oval, fimbriated, crenated or polyhedral in appearance. The growing trophozoite forms are rounded, non-amoeboid, or only very slightly amoeboid. Pigment appears early, is relatively abundant, the granules are fairly coarse, and the colour varies from greenish brown to almost black.

The mature schizont-rosettes recall those of *P. falciparum*, but the number of merozoites is much less—from 8 to 11, usually 10. They lie in red corpuscles which are not enlarged, and may or may not quite fill the infected cell. The merozoites are arranged in a grape-like cluster. The duration of the schizogony cycle is 24 hours.

The gametocytes resemble those of *P. malariae*; they lie in red corpuscles which are neither enlarged nor stippled. Their pigment is coarse and dark.

The infection has not yet been transmitted by mosquitoes (in India).*

The infection in *S. irus* is mild, and parasites very scanty in films of the peripheral blood. When passaged

* In a recent private communication, the senior author has been informed that mosquito transmission of this species has been obtained at Horton in England

into *S. rhesus* the infection flares up, with the blood swarming with parasites; the infection in this species is invariably fatal (unless treated with quinine or atabrin), and often associated with a terminal hæmoglobinuria.

In splenectomized *S. irus* the infection proves fatal, but quinine or atabrin treatment may save life.

Thanks to Colonel Sinton's assistance we now have pure-line strains of both *P. inui* var. *cynomolgi* and *P. knowlesi* maintained in our department, and during the past two years have carried out much experimental work with them. The *P. knowlesi* strain has proved valuable in experimentally testing new synthetic remedies against malaria in monkeys.

* * * * *

During the year 1933 six *S. irus* monkeys were inoculated with massive doses of *P. knowlesi* from infected *S. rhesus* monkeys. These all took the infection, but showed only scanty parasites in the blood films, and recovered spontaneously after varying periods.

Now, Kikuth (1933) and Regendanz, working on *Trypanosoma lewisi* infection in rats, have shown that if the spleen be extirpated at the commencement of the infection, one can often observe that the increase in the number of trypanosomes is extended over a much longer period, and the non-pathogenic *T. lewisi* in many cases takes on a pathogenic character. This they attribute to the fact that the spleen produces a substance—ablastin—which inhibits multiplication of the trypanosomes. Accordingly, we decided to test whether splenectomy would reduce the resistance of *S. irus* to infection with *P. knowlesi*, to which it is usually rather tolerant.

A splenectomized Silenus irus

A young *S. irus* monkey, weighing 1 kilo, 190 grammes, was taken, and thin and thick blood films from it examined daily for five days. No parasites were detected.

With some difficulty 2 c.cm. of blood was withdrawn from its great saphenous vein and inoculated into a young *S. rhesus* monkey—an animal exquisitely susceptible to monkey malaria. We had previously found in the case of a human volunteer infected with monkey malaria that when parasites were extremely scanty in the blood and could easily be missed in blood films the inoculation of 5 c.cm. of blood from the patient into a *S. rhesus* resulted in a fatal infection in that animal. We regarded this test as the most crucial one applicable to ensure that the donor was not infected with monkey malaria naturally acquired.

The inoculated *S. rhesus* remained quite well and free from infection. We concluded therefore that the *S. irus* was free from natural malaria infection. The monkey was now splenectomized. For 24 hours it was given water only and no solid food. On the third day

after operation it appeared to be in good health and took its usual diet.

Nine days after the splenectomy the monkey appeared to be in good health and to have completely recovered from the effects of the operation. (Unfortunately blood films were not examined from it during this period.)

It was now inoculated intraperitoneally with one c.cm. of blood from a *S. rhesus* infected with *P. knowlesi*—a dose of approximately 94 million parasites. This strain of *P. knowlesi* had been serially passaged through 62 *S. rhesus* monkeys, was a pure-line strain with constant morphology, and, as far as we knew, quite unmixed.

The incubation period in *S. irus* monkeys inoculated with monkey malaria in our previous series (Knowles and Das Gupta, 1932) had been from 7 to 11 days, and during the first five days after inoculation blood films were unfortunately not taken from this animal. The monkey appeared to be in good health.

On the fifth day after inoculation the monkey suddenly became acutely ill and died. An immediate post-mortem examination was held, and revealed an almost incredibly heavy infection in the heart blood. No less than 78.5 per cent of the erythrocytes were infected, some cells even containing as many as three parasites. Fig. 1 is

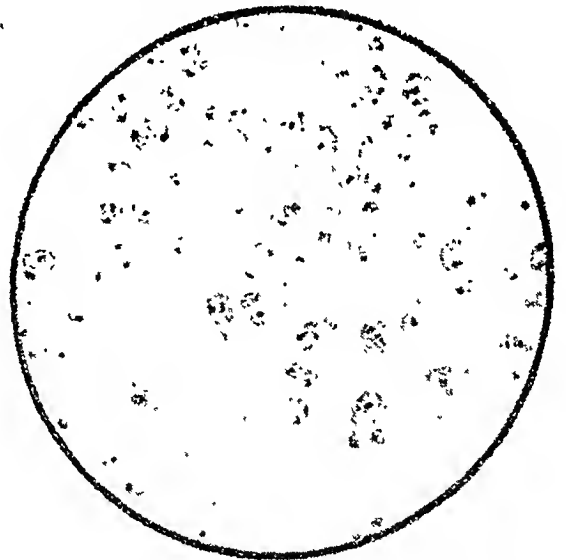


Fig. 1.—Photomicrograph of a smear of the heart blood, showing the intensity of the infection, and that some of the infected red corpuscles are definitely enlarged and stippled ($\times 700$).

a photomicrograph from a stained film of the heart blood. Fig. 2 is a composite drawing from different fields of the same. Fig. 3 is a drawing from a section of the liver. The extreme intensity of the infection will be realized from these figures. It recalls that seen in a *S. rhesus* dying from a fatal infection with *P. knowlesi*, and is utterly unlike the scanty and benign infections in non-splenectomized *S. irus* with this species of monkey malaria.

The amazing feature of the infection, however, was that a dual infection with both

P. knowlesi and *P. inui* var. *cynomolgi* was present. The cytoplasm of the growing trophozoites was not amœboid, but many of the infected red corpuscles were markedly enlarged and showed Schüffner's dots.

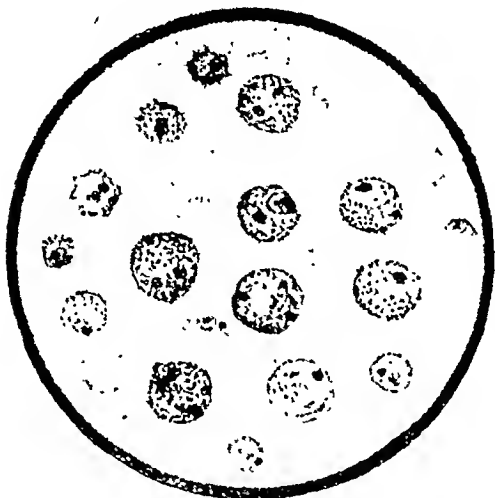


Fig. 2.—Photograph of a coloured drawing from a stained film of the heart blood, showing the presence of both *P. inui* var. *cynomolgi* and *P. knowlesi*.



Fig. 3.—Section of the liver, showing the venous sinuses distended with infected red corpuscles and pigmented Küpffer cells.

Two questions immediately arise :—

(i) Was the blood of the donor infected with both malaria species? This, we believe, may be ruled out at once. The strain of *P. knowlesi* used was a pure-line strain; it had been passaged in series through 62 *S. rhesus* monkeys, and had never shown any variation from its normal morphology and virulence.

(ii) Did the *S. irus* have a latent infection with *P. inui* var. *cynomolgi* which was not detected by blood examination, or even by inoculating its blood into a *S. rhesus*—an

extremely susceptible animal? This infection flared up as the result of the splenectomy.

Latent infections in Silenus irus

We believe the second to be the real explanation of the presence of both species of malaria parasites. In order to test this question further, five young *S. irus* monkeys were purchased in the market, separately caged, and thin and thick blood films examined daily from each for ten days. Results were as follows :—

Monkey A showed scanty or very scanty parasites on the 3rd, 4th, 5th, 6th, 8th, 9th and 10th days of examination, i.e., the films were positive on seven out of ten examinations. The species present was *P. inui* var. *cynomolgi*, and all phases—rings, growing trophozoites, schizonts and gametocytes—were seen.

Monkeys B, C and D gave negative results throughout.

Monkey E showed extremely scanty parasites on the 1st, 3rd, 6th, 7th and 10th days of examination, i.e., five out of ten examinations were positive. On four of these occasions only very scanty rings were detected in the thick films. On the 7th day extremely scanty gametocytes were seen. The infection was so scanty that it was impossible to determine the species of parasite present.

Thus, prolonged blood examinations showed two out of the five monkeys to be naturally infected with monkey malaria. Three appeared to be absolutely free from infection.

Having failed to detect parasites in three out of the five monkeys, we decided to induce protein shock, and gave to each of all five monkeys an injection of 2 c.cm. of normal horse serum, as suggested by Sinton and Mulligan (1933) to re-awaken any latent infection. Four hours after the injection thin and thick blood films were taken from each monkey and, after fixation and staining, were very carefully searched. Monkeys A and E showed a definite increase in the number of parasites present. No parasites could, however, be detected in the films from monkeys B, C and D, despite prolonged search. Thus, after protein shock, three out of the five monkeys still remained 'negative'.

We next tried the method we have always used for the diagnosis of latent infections; Sinton and Mulligan (1933) have suggested the name 'isodiagnosis' for this method. From each of the three monkeys B, C and D, two c.cm. of blood was withdrawn and injected into a *S. rhesus* monkey—three of the latter being used. The *S. rhesus* inoculated from *S. irus* B showed a severe infection with *P. knowlesi*, thus showing that *S. irus* monkey B was infected with this parasite. The *S. rhesus* monkeys inoculated from monkeys C and D remained in good health, showed no parasites at any time, and at the time of writing—33 days after the inoculation—show no trace of infection. Thus,

by isodiagnosis, a third monkey—B—was found to be infected.

Finally, we splenectomized *S. irus* monkeys B, C and D. Thin and thick blood films from all three monkeys were examined daily, after the splenectomy, with the following results:—

Monkey B showed an infection with *P. inui* var. *cynomolgi* from the fourth day onwards. Some of the forms encountered were suspicious of a mixed infection with *P. knowlesi* as well. This monkey still remains in good health and still shows parasites on the 33rd day after inoculation. The infection is a low grade one.

Monkey C showed a mixed infection with *P. inui* var. *cynomolgi* and *P. knowlesi* on the fourth day after inoculation. This flared up with great rapidity and the monkey died on the seventh day after inoculation with its blood swarming with parasites.

Monkey D showed an infection with *P. inui* var. *cynomolgi* on the fifth day; this infection is a scanty one; the animal is in good health, but is still infected on the 33rd day after inoculation.

Discussion

To summarize, we may put the case as follows:—

(i) By prolonged blood examinations over ten days two monkeys—A and E—were found to be infected. By ordinary laboratory standards the other three monkeys—B, C and D—would be regarded as 'clean' (i.e., non-infected) animals.

(ii) Protein shock did not improve these findings; the parasites in monkeys A and E became more numerous, but monkeys B, C and D were still 'negative'.

(iii) 'Isodiagnosis' (i.e., inoculation of the blood into the very susceptible *S. rhesus*) showed that monkey B was also infected. This procedure showed that a third out of the five monkeys was infected.

(iv) Blood examinations after splenectomy showed that monkeys B, C and D were all infected. In other words, all five *S. irus* monkeys, taken at random, showed malaria infection but this fact was only detected after splenectomy.

With regard to species, the infections were as follows:—

Monkey A was infected with *P. inui* var. *cynomolgi* only.

Monkey B was infected with *P. inui* var. *cynomolgi*, possibly with a scanty infection with *P. knowlesi* as well.

Monkey C was infected with both *P. inui* var. *cynomolgi* and *P. knowlesi*; this infection proved fatal after splenectomy.

Monkey D was infected with *P. inui* var. *cynomolgi* only.

Monkey E showed infection, but the parasites were so scanty throughout that the species could not be determined.

Sinton and Mulligan (1933) comment on the following methods for detecting latent malaria infection in monkeys:

(i) Blood examinations (thick films) searched at weekly intervals over a period of some months. This is admittedly a tedious procedure, and would probably have to be supplemented by even more prolonged search of thin films for the species diagnosis.

(ii) Cultural methods, by the Thomson's modification of Bass and John's technique. Here the diagnosis of species may be impossible, as the predominant strain may overgrow a scanty infection with another species. Also other methods are more easily carried out, and possibly more reliable.

(iii) Protein shock. Sinton and Mulligan consider this a valuable aid to the diagnosis of latent infections, and give records of other workers who have also found it useful. It certainly increases the number of parasites in the peripheral blood, and may possibly be of value in the diagnosis of latent malaria in man. On the other hand, as our experience with the five monkeys shows, it often fails to reveal a latent infection.

(iv) 'Isodiagnosis', i.e., the inoculation of the blood into a susceptible animal of the same genus. This gave us a third positive out of the five monkeys concerned in the experiments recorded above. It is not applicable to man, since no animal susceptible to inoculation with human malaria has so far been discovered. Sinton and Mulligan consider that with methods (iii) and (iv) combined, extremely few, if any, latent infections would escape detection.

(v) Splenectomy, followed by daily examinations of thin and thick blood films. Sinton and Mulligan consider this a most valuable procedure; on the other hand 'animals which have proved to be uninfected by this method cannot afterwards be used to study the usual pathogenic effects of any species of *Plasmodium* in the normal animal. This is a distinct disadvantage'. In our hands, however, in the above series of five monkeys, the method revealed two latent infections which had defied diagnosis by all other methods. To find out whether a monkey has a latent infection or not, it seems the most reliable of all methods. Unfortunately, it may result in the infection flaring up and proving fatal, e.g., monkey C.

Sinton and Mulligan (1933) recommend the following routine procedure in the detection of latent malaria infections in monkeys:—

(i) Examination of thick blood films daily for some weeks. If no infection is detected, then—

(ii) Protein shock. If no parasites are detected within 24 hours, then—

(iii) Isodiagnosis. If no parasites have been detected by all three methods, they regard the animal as not infected, and state that in their

hands splenectomy has not improved the diagnosis if these three methods fail. Our experience with the five monkeys whose history has been detailed above has been different.

It would seem that in Nature *Silenus rhesus* monkeys are never or hardly ever infected with malaria parasites. The matter is fully discussed by Sinton and Mulligan (1933). They give all the records available from the literature. Only two reliable records of natural infection of this species with monkey malaria are on record: one by Chimisso (1922), the species having been identified as *Plasmodium scimipitheci* by Sinton and Mulligan (1932), and the other a record of infection with *P. inui* in *S. rhesus* in Tonkin by Mathis and Leger (1911). Thousands of specimens of *S. rhesus* must have been subjected to the most careful scrutiny in connection with the investigation of other diseases, yet there is no other record of natural plasmodial infections in this species of monkey. From 1912 to 1914 Colonel Acton, I.M.S., and the senior author of the present paper examined the blood of every *S. rhesus* used at the Pasteur Institute of India, Kasauli, in any experimental work in the hope of obtaining a natural strain of monkey malaria, but never found any infected. Since the Calcutta School of Tropical Medicine was opened in 1921, the authors of the present paper have year by year searched blood films of monkeys of this species used for other experimental work, amounting to some hundreds in all, and have never detected any infection. Sinton and Mulligan (1933) record having examined the blood of more than 300 monkeys of this species, without detecting any infection.

On the other hand, it would be interesting to carry out splenectomy in this species, and see whether by this procedure the existence of any latent infections can be brought to light. Also *S. rhesus* is readily susceptible to infection with *P. inui* var. *cynomolgi*, and—one may say—exquisitely susceptible to infection with *P. knowlesi*, the latter infection invariably proving fatal, if treatment is not instituted.

Matters are quite different with *Silenus irus*. As will be seen from the results recorded in this paper, six specimens of this species, bought at random in the Calcutta market, all showed infection with monkey malaria, the infection being revealed by blood examination in two, and being latent in the other four. Young specimens of *S. irus* appear to be infected with monkey malaria almost without exception. Further, as has been shown by Knowles and Das Gupta (1932), this infection is transmissible to man, and may provoke quite a severe attack of malaria in this subject.

Summary

1. A description is given of the two parasites concerned in monkey malaria in Malaya, viz *P. inui* var. *cynomolgi* Mayer, 1907, and *P. knowlesi* Sinton and Mulligan, 1932.

2. A splenectomized *Silenus irus* monkey inoculated with *P. knowlesi* from an infected *Silenus rhesus* died with an overwhelming malaria infection. Examination of the heart blood after death showed both *P. inui* var. *cynomolgi* and *P. knowlesi* to be present. Presumably the *S. irus* had a latent infection with the former species, which was re-awakened into activity by the splenectomy.

3. In order to test this point further, five fresh *S. irus* monkeys were purchased. Repeated blood examination showed that two of these were infected. The induction of protein shock did not improve the findings. By 'isodiagnosis'—i.e., inoculation of the blood into a susceptible host of the same genus—a third monkey was found to be infected. Finally, by blood examination after splenectomy, all five monkeys were found to be infected. In one monkey (C) splenectomy caused a latent infection to flare up and become fatal.

4. Monkeys of species *Silenus (Macacus) rhesus* appear to be almost entirely free from naturally-acquired monkey malaria; on the other hand monkeys of species *Silenus irus (Macacus cynomolgus)* appear to be very heavily parasitized with both *P. inui* var. *cynomolgi* and *P. knowlesi*, young monkeys of this species being almost always infected.

5. Methods of detecting latent malaria infection in monkeys are discussed. The most certain method appears to be blood examination after splenectomy.

Acknowledgments

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REFERENCES

- Chimisso, L. (1922). Su un Plasmodio della malaria di scimmia (*Macacus rhesus*). *Haematol.*, Vol. III, p. 38.
- Kikuth, W. (1933). Immunity in protozoal diseases. Separatum from *Medizin und Chemie*, 1933. (Reports from the Medico-Chemical Research Laboratories of the I. G. Farbenindustrie Aktiengesellschaft).
- Knowles, R., and Das Gupta, B. M. (1932). A Study of Monkey Malaria, and its Experimental Transmission to Man. *Indian Med. Gaz.*, Vol. LXVII, p. 301.
- Mathis, C., and Leger, M. (1911). Plasmodium des macaques du Tonkin. *Ann. Inst. Pasteur*, Vol. XXV, p. 593.
- Napier, L. E., and Campbell, H. G. M. (1932). Observations on a Plasmodium Infection which causes hæmoglobinuria in certain species of monkey. *Indian Med. Gaz.*, Vol. LXVII, p. 246.
- Sinton, J. A., and Mulligan, H. W. (1932 and 1933). A critical review of the literature relating to the identification of the malarial parasites recorded from monkeys of the families *Cercopithecidae* and *Colobidae*. *Rec. Malaria Survey, India*, Vol. III, pp. 357 and 381.
- Sinton, J. A., and Mulligan, H. W. (1933). Mixed infections in the malaria of the lower monkeys. *Ibid.*, Parts I and II, Vol. III, pp. 719 and 769.

A CLINICAL STUDY OF CLIMATIC BUBO AND ALLIED CONDITIONS

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AN increasing volume of literature on this subject, both clinical and experimental, has been appearing in foreign medical journals for the past decade. Though this disease is fairly common in this country, there has been little reference to it in medical journals in India; this state of affairs seems to justify this article. The writer has attempted a clinical review of climatic bubo and allied conditions, examined and treated during the year 1933 in the venereal clinic of the Madras General Hospital.

It is now generally recognized that the disease belongs to the venereal group and is caused in the vast majority of cases by sexual contact. Stannus (1933) called it 'the sixth venereal disease'. The experimental researches of continental workers, such as Hellestrom and Levaditi, have proved that the disease is caused by a filterable virus, and that what is known as lymphogranuloma inguinale in the West is identical with climatic bubo in the East. The outstanding pathological feature of the disease is the predilection of the virus for the lymphatic system where it induces characteristic changes.

The introduction of Frei's intradermal test with an antigen prepared from the pus of climatic bubo has not only been of immense value in diagnosing this condition from other forms of lymphadenitis but has also helped to include other clinical manifestations of the disease, such as elephantiasis of the genital regions in both sexes, ulceration of the vulva, perianal elephantiasis, and ulceration and inflammatory stricture of the rectum, under the same aetiological group.

The number of cases investigated and treated is as follows :—

TABLE I
Climatic bubo

	Males	Females
Climatic bubo only	99	2
Climatic bubo with other venereal diseases	51	1
with active syphilis .. 6		
with latent syphilis .. 6 (1 female)		
with positive strong Wassermann reaction in which there was no history or clinical evidence of syphilis 14		
with positive Wassermann reaction in which there was no history or clinical evidence of syphilis 10		
with gonorrhœa .. 5		
with gonorrhœa and active syphilis .. 2		
with chancreoid .. 8		

TABLE I. *Climatic bubo*—concl.

	Males	Females
Genito-anorectal syndrome of the same aetiology	18	8
Elephantiasis vulva with or without ulceration .. ..	..	4
TOTAL ..	168	15

Frei's reaction

As far as possible the diagnosis of these conditions was confirmed by the Frei's intradermal test. As can be seen from the figures given below, the specificity of the test is very high. The antigen was prepared for us by Dr. Goyle, Professor of Pathology, Medical College, Madras, from the pus of infected glands removed by operation in the clinic. The value of each batch of antigen was tested by controls on normal patients or patients suffering from other venereal diseases. All the batches of antigen supplied except one were found to be quite reliable. 0.1 c.cm. of the antigen was injected intradermally on the flexor aspect of the forearm and at the same time a saline control was also carried out. The reaction was examined 48 hours later. A well-marked reddish infiltrative dome-shaped papule was taken as a standard reaction for the positive result (figure 1). In the majority of positive cases the reaction was fairly well marked after 48 hours.



Fig. 1.—A case of climatic bubo (a) with positive Frei's reaction (b). The lighter area on the forearm represents the papule. The print with the arrow is the saline control.

In three cases the reaction was delayed as long as 96 hours after the test. In nine cases the reaction showed a tendency to central necrosis (figure 2). In 19 cases the infiltrated papule was more than 1 cm. in diameter with œdema all round and in a few cases the lymphatic gland at the bend of the elbow was enlarged and slightly tender. In all the positive cases the reaction took on an average eight to ten days to subside completely, leaving a pigmented

mark over the site of injection. In a few cases of climatic bubo of less than one week's duration, the Frei's test was at first negative but when the test was repeated at intervals of a

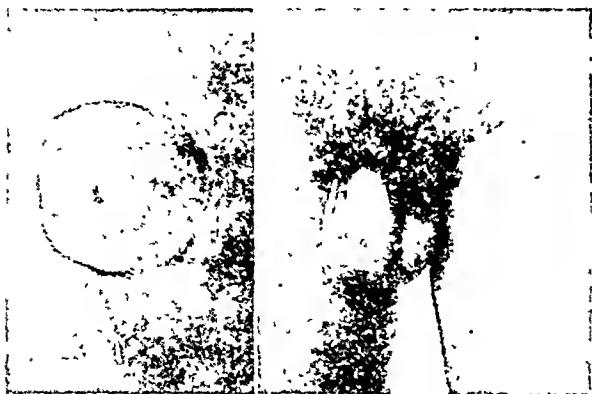


Fig. 2.—A case of climatic bubo with a pustular Frei's reaction. (Note the central pustulation with the infiltration of the papule; the arrow marks the control.)

week the positive reaction began to appear (*vide* case II).

The test was not performed in all the cases under review as during the first three months of the year the antigen was not available. Altogether it was done 281 times in 269 persons; it was positive in 124 cases, negative in 103, and 42 patients did not attend again so that their result was not read. The results are analysed in tables II and III.

TABLE II

Analysis of positive Frei's test

	Males	Females
Climatic bubo only	51	1
Climatic bubo with other venereal diseases	46	1
with active syphilis .. 6		
with latent syphilis .. 6 (1 female)		
with positive strong Wassermann reaction but no history or clinical evidence of syphilis .. 11		
with positive Wassermann reaction but no history or evidence of syphilis .. 8		
with gonorrhoea .. 5		
with gonorrhoea and syphilis .. 2		
with chancroid .. 8		
with infective granuloma 1		
Genito-anorectal syndrome	14	7
Elephantiasis and ulceration vulva .. ..	..	4
TOTAL	111	13

TABLE III

Analysis of negative Frei's tests

	Males	Females
Climatic bubo	3	1
Genito-anorectal syndrome	2	0
Chancroid	4	3
Chancroid and bubo	16	0
Active syphilis	33	4
Latent syphilis	2	1
Syphilis and gonorrhoea	0	1
Gonorrhoea	8	0
Infective granuloma	6	3
Warts on penis	1	0
Non-venereal cases	11	4
TOTAL	86	17

Table II includes six cases of positive Frei's reaction but with no *active* climatic bubo; there was a history of past bubo with evidence of scars in the groins in these cases. The positive reactions in these cases show that the person may retain the allergic sensitivity long after the disease is cured.

EPIDEMIOLOGY

Sex incidence.—The marked disproportion of 50 to 1 in the sex incidence of climatic bubo is a striking feature and in our series is much more marked than the figures quoted by other workers. Two explanations may be adduced for the rarity of the condition in women. It is quite possible that the women may harbour the virus as a saprophyte in their genitals without suffering any disability though being infective to male contacts. The second possible explanation is the peculiarity of the lymphatic drainage of genitals in women. Only the upper half of the vulva and clitoris have lymphatic connections with the groin glands; the lymphatics of the lower part of the vulva, vagina and cervix drain into the pelvic and perirectal lymphatic glands.

Age incidence.—The ages of the patients varied from 15 to 60 years, the majority being between 20 and 30.

Racial incidence.—Among the males 130 were Hindus, 13 were Mohammedans, 3 were Indian Christians, 3 were Anglo-Indians and 1 European. The females were all Hindus. In the case of males a history of extra-marital coitus was elicited in 145 cases; the three females were all prostitutes.

The primary lesion.—As is well known, the primary lesion through which the virus enters the lymphatic system is so small, painless and evanescent that the patients do not notice it. In our series in the males, there was no history or evidence of penile lesion in 104 cases. In 17 cases the lesion was single, small, superficial, painless, herpetiform and disappeared in a few days. In six cases the sore was single, sloughy, painful with irregular undermined edges. Dmelcos' test was positive in all the cases. In seven cases the sores were multiple; of these two were positive to Dmelcos' test. In three cases

the sore was single, slightly indurated, and nodular and *Spirochæta pallida* was found in one of these. In 13 cases there was a mucopurulent urethral discharge. Examination of smears showed that seven were cases of gonorrhœa and in the remaining six the smears showed only pus cells without any organisms. It is surmised that, in these six cases, the initial lesion was inside the urethra setting up a urethritis. The common situation for the typical primary lesion of climatic bubo was the frenal site or inner aspect of the prepuce. In the three cases in women, no primary lesion could be seen.

Incubation period.—The interval between the infecting coitus and the appearance of the bubo varied from a few days to three months, the average being seven to 10 days. The duration of the bubo varied from five days to eight years.

Site of bubo.—In 120 cases the bubo was unilateral. Sixty-four were in the right and 56 in the left. In 27 cases the condition was bilateral. In six cases there were only multiple scars in the groins or a single operation scar of past bubo. In 38 of the total number of cases the glands were broken down resulting in multiple fistulæ. The glands affected were those of the inguinal group. In a few of the long-standing cases the femoral group was also involved. The enlargement of the iliac glands was noted in 45 of the cases.

Onset and course.—The onset of the disease is usually insidious. The evolution is slow and the condition is subacute from the beginning. The glands of the groin get enlarged with india-rubber consistency and are slightly tender in the early stages. At this stage the glands are very like those of syphilis. In the course of one or two weeks they become matted together by peradenitis and tend to adhere to the overlying skin which becomes thickened, rugose and assumes a peculiar violaceous tint in fair-skinned individuals. Multiple points of fluctuation next appear and may break down, discharging a small quantity of thick creamy pus, and in a neglected case the groins may be riddled with these fistulæ. Secondary infection may supervene and the discharge become more profuse. Changes may occur in the skin of the areas drained by the affected lymphatic glands. A subacute lymphangitis with œdema may affect the skin of the penis, scrotum, groin and upper part of the thigh. Infection may spread to the femoral set of glands and occasionally a phlebitis of the saphenous vein may supervene. In long-standing cases, multiple chronic indolent fistulous ulcers occur on the skin of the penis, scrotum, pubic region and thighs. It is not known whether these ulcers are directly due to the activity of the virus or secondary to lymphatic obstruction and invasion of the area by other organisms. The iliac set of glands rarely undergo suppuration. In a few of the cases, the involvement of the inguinal glands was

minimal, the chief brunt of the infection falling on the iliac group which formed a large tender mass. The tendency of inguinal adenitis is not always to suppurate and burst through the skin; in some cases, the enlargement unaccountably disappears even without any treatment, to reappear after varying intervals. Such recurrent adenitis without abscess formation was observed in half a dozen of our cases.

Constitutional symptoms.—A low fever was fairly common during the first week or two of the disease. Lassitude, headache, and arthralgias are constant features. Blood examination showed a moderate leucocytosis in the early stages. Blood changes of secondary anæmia were observed in a few of the long-standing cases. The only skin affection observed in our cases was a pustular impetiginous eruption on the extremities and buttocks. In none of the cases was any general lymphadenitis or enlargement of the spleen noticed. In one case (case II) the onset of the disease was very acute with bilateral tender inguinal adenitis, severe constitutional symptoms of high fever, profound toxæmia, delirium, etc. Blood examination showed a polymorphonuclear leucocytosis (22,000 per c.mm.). The patient was in a toxic condition for nearly a week and then gradually recovered. Such an onset and course is very unusual in climatic bubo.

Association with other venereal diseases.—As may be seen from table I, climatic bubo may coexist with other venereal diseases, but its course and evolution was not in any way modified by them.

The behaviour of the Wassermann reaction in climatic bubo.—There were 24 cases of clinically undoubted climatic bubo in which the Wassermann reaction of the blood was either strongly positive or weakly positive. In 19 of these cases, Frei's test was positive. In none of these cases there was either a history or clinical evidence of syphilis. We were not able to follow the subsequent behaviour of the Wassermann reaction in these cases but in a few the test became negative after a few weeks though the patients did not get any antisyphilitic treatment. This positive Wassermann reaction has been observed in the early stages by American workers. This peculiarity in the behaviour of the Wassermann reaction requires further investigation before any definite opinion can be given regarding the specificity or otherwise of the reaction.

Diagnosis.—Diagnosis is usually a simple matter in uncomplicated cases. The points for diagnosis to remember are the presence of a tiny superficial painless evanescent primary penile lesion, more often the absence of any such lesion, the subacute inguinal adenitis, the slow course of the disease with a tendency to multiple foci of suppuration, the iliac adenopathy, the positive Frei's reaction when the test is performed with a reliable antigen and the

negative Wassermann and Dmeloos' tests in uncomplicated cases.

Prognosis.—As regards life, this is good, but the chronic morbidity associated with the disease, the absence of any specific treatment and the occurrence of anorectal ulceration and stricture in an unknown proportion of cases, make it rather a serious condition to contend with.

TREATMENT

It should be remembered at the outset that the condition may spontaneously subside and care should be taken in evaluating the efficacy of any particular therapeutic measure. The following are some of the methods advocated in the treatment of the disease :

1. Total or partial enucleation of the glands by operation.
2. The injection of antimony salts, *e.g.*, tartar emetic, neo-stibosan, urea stibamine and Fouadin.
3. The intramuscular injection of Solganol B (watery solution).
4. Injection of glycerine into the infected lymph nodes.
5. Intravenous injection of Frei's antigen filtered through gauze.
6. Injection of sera of patients convalescent from climatic bubo.
7. Protein shock and pyrexial treatment, *e.g.*, milk, T. A. B., and Dmeloos' vaccines.
8. Injection of iodine and its compounds.
9. X-rays.

We have tried complete enucleation in a number of cases with immediate satisfactory results, but in a large proportion of these a troublesome recurrent lymphangitis of the skin of the penis, scrotum, groin and thigh with bouts of fever and joint pains occurs. Further, from the records of the history of anorectal syndrome we have collected so far, a large percentage of these complications has occurred in males who had previously sustained a total enucleation. If this is true, there is a real danger in indiscriminate removal of the glands. In these cases it is quite possible that the first line of defence against the infection having been suppressed by total removal, the virus is enabled to disseminate unchecked into the lymphatics of the pelvis and perirectal regions resulting in perirectal infiltration, rectal stricture, ulceration, etc. Hence complete removal of the glands is not advocated and partial removal is recommended.

In our experience the following procedure has given the best results. In cases of unbroken climatic bubo the patient is given a course of Dmeloos' vaccine or milk injection on alternate days for four to six injections. In the majority of cases the glands subside remarkably. This is followed by a course of Fouadin injections on alternate days till the patient has received at least 50 to 60 c.cm. of the solution. Should any fluctuation be noticed in the glands, aspiration is performed and repeated if necessary. When the glands have almost subsided and

there is no pain or tenderness, the patients are discharged and advised to report as soon as there is any recurrence of the trouble, and the same treatment is repeated. Examination of the anus and rectum should be a routine practice in all cases of apparently-cured climatic buboes.

Our experience with solganol B was limited to a few cases and no definite opinion could be given about its therapeutic efficacy. Injection of neutral iodine or sodium iodide was extensively tried in previous years and was given up. We have no experience of methods 4, 5, 6 and 9 of the above list.

In a few of the cases on which we operated, after the groin wound was completely healed, the patients used to report with recurrent attacks of fever, joint pains, and painful oedema of the lymphatic area around the scar and sometimes of the penis, scrotum and thighs. The condition lasted for a week to 10 days and spontaneously subsided without any treatment. This periodicity in the constitutional symptoms bears a close resemblance to that observed in Hodgkin's disease. Two explanations may be offered for this clinical phenomenon; it may be due to the activation of the virus at the local site or it may mean that each invasion of the virus into the deeper lymphatic fields of the pelvis causes this train of symptoms.

Illustrative cases

I. Indian Christian male, aged 17 years. Denied any previous venereal history. Active agent in sodomy 45 days before he came to the clinic.

Physical examination.—No penile sore or urethral discharge. Long prepuce, with a dirty sub-preputial sac. Bilateral subacute inguinal adenitis of one month's duration. The glands were hard, matted together and adherent to the skin. The glands on the left side were bigger than those on the right. The masses were tender to palpation. Both iliac glands were enlarged, hard and tender. Frei's test was positive. Blood Wassermann was strongly positive. Patient had a few milk injections and one course of neosalvarsan and bismuth. It took five months for the glands to subside. Frei's test was positive again four months after the bubo had completely subsided. Wassermann was weekly positive then. He developed herpes zoster a month after the last neosalvarsan injection.

The points to note in this case are:—(a) the absence of a primary lesion, (b) the clinical condition of the bubo with iliac adenopathy, (c) the positive Frei's reaction, (d) the strongly positive Wassermann reaction in the absence of any clinical evidence of syphilis, (e) the slow response of the glands to antisymphilitic treatment, (f) the persistent positive Frei's reaction nine months after the appearance of the bubo, (g) the mode of infection.

II. Hindu male, aged 20. Exposure to infection three weeks before admission. No history of previous venereal disease.

Condition on examination.—A tiny superficial painless herpetiform sore at the frenal site. Bilateral inguinal adenitis, painful and tender, four days duration. Iliac glands—negative. No skin or mucous membrane lesion. Frei's test was negative at the time of admission. Blood Wassermann—positive. The patient was kept as an in-patient. He ran a high remittent temperature ranging from 102°F. to 104°F. for nearly a week. He was very toxic, slightly delirious, complained of pains in the joints and nape of the neck.

The temperature came down after a week with expectant treatment, but the groin condition became worse with increase in the size of the gland masses with adhesion of the skin. Iliac glands were enlarged, hard and tender at this stage. Frei's test was repeated and was strongly positive with a pustular reaction. Blood Wassermann reaction became strongly positive. No clinical evidence of syphilis. He had a course of Dmeleos' injections without much benefit. Multiple points of fluctuation appeared in both groins. At this time, nearly six weeks after the appearance of the bubo, he developed lymphatic oedema of the skin of the penis and scrotum. The Frei's test was repeated for the third time and was strongly positive, but the blood Wassermann reaction was negative. The patient defaulted and no further observation could be made.

The points worthy of note in this case are:—(1) The acute onset with severe constitutional symptoms of toxæmia; (2) the initial negative Frei's test which became positive after two weeks, and (3) the positive Wassermann reaction in the early stages of the disease which became negative in two months in the absence of any history or clinical evidence of syphilis.

III. Hindu male, aged 20. Denies any previous venereal disease. Exposure to infection two weeks before admission.

Condition on admission.—25th September, 1933. A soft undermined painful sloughing sore at the frenal site. No urethral discharge. Groin glands, skin and mucous membrane—negative. Dark ground examination of the sore for *Spirochaeta pallida*—negative. Wassermann reaction—negative. Local treatment with calomel and sulphur was given. The sore did not heal but was stationary. On 22nd October Dmeleos' intradermal test was positive. A course of Dmeleos' injections were given on alternate days, and the sore showed signs of rapid healing. On 9th November the patient developed enlarged tender glands in the left groin. Within a week the glands became considerably enlarged, matted and tender. The left iliac glands were also enlarged. The frenal sore had healed by this time. On 15th November Frei's test was doubtful-positive. A course of Fournier injections were given without any benefit. On 24th November Frei's test was strongly positive with a tendency to pustulation. Wassermann reaction was negative. On 5th December complete enucleation of the glands was performed under spinal anaesthesia. The wound healed in two weeks and the iliac glands disappeared.

Note.—This is a case of chaneroid with climatic bubo in which the virus of climatic bubo was incubating while the chaneroid was healing.

IV. Hindu male, aged 26. Attended the clinic in 1922 with bilateral buboes. Enucleation of the left groin glands was then performed. The glands in the right side subsided. Frei's test was not then performed. Blood Wassermann was negative. He came to the clinic 12 months afterwards with a history of repeated attacks of fever, pains all over the body, and painful swelling in both groins.

Condition on admission.—No penile sore, or scar or urethral discharge. Scar of operation in the left groin. Right groin glands enlarged, hard and painless. Lymphatic oedema of the skin of the upper part of the thigh and gluteal regions on the left side. Temperature 101.4°F. Complained of severe pains all over the body. Frei's test was positive and Wassermann-negative. The condition subsided with rest in the hospital and calcium chloride injections. The patient has since been coming to the clinic at intervals of six to eight weeks with the same recurrent attacks of fever, pains, etc. The oedema of the skin round about the old operation scar was becoming more marked and permanent with each attack. Repeated blood examination for filaria was negative. Frei's test was positive every time. Rectal examination revealed nothing abnormal.

This case illustrates the fact that the virus of climatic bubo may show periods of activity with intervals of

comparative quiescence. We have had three more such cases, and, whether it is a coincidence or not, all the cases have sustained enucleation of the glands at the time of the first attack.

V. European male, aged 25. A Swedish sailor who contracted the infection outside India. History of exposure to infection at Mauritius with a native woman 18 days before he was seen by us. Noticed a penile sore two days, and the swelling in the groins eight days after exposure. Small painless erosive sore at the frenal site. No urethral discharge. Bilateral inguinal adenitis of the size of a closed fist. The glands were hard, matted together and tender. The skin over the glands was slightly oedematous and purplish in colour. Both iliac glands were enlarged, hard and tender. Dark-ground examination of the sore was negative. Frei's test was strongly positive. Blood Wassermann was a single plus. Had a temperature of 100.2°F. on admission. Patient left Madras after three days as his boat sailed.

GENITO-ANORECTAL SYNDROME

This grave clinical condition has, thanks to the specific diagnostic value of Frei's test, been recognized as lymphogranulomatous in origin. It was for years thought to be a syphilitic manifestation, the so-called anorectal syphiloma of Fournier, though the condition was found resistant to antisyphilitic treatment and the Wassermann reaction was frequently negative. Koch's infection was also suspected in these cases on account of the close similarity in the histological appearance of the lesions. In our own experience the disease was mistaken for infective granuloma of the anus and rectum. In women it was considered to be gonorrhœal in origin. Many of these patients had fallen into the hands of surgeons who variously diagnosed the condition as fissure of the anus, fistulo-in-ano, inflamed piles, and malignant disease. It is only within the last few years that its ætiological relationship to climatic bubo has been recognized. The chain of evidence is almost complete, but Frei is still in doubt whether these anorectal complications are the direct results of the activity of the virus of climatic bubo, or the reaction of sensitized tissues to non-specific antigen and secondary infection. The localization of the disease in the perirectal and perianal lymphatics is stated to be more common in women on account of the peculiarity of the lymph drainage of the genitals, but in our series the males predominated over the females in the proportion of 2 to 1.

The cases

Eighteen were males whose ages varied from 16 years to 55 years, and eight were females aged from 15 to 32 years.

Among the males, six patients were professional passive agents in sodomy. Among the females five were prostitutes and three married women. There was a history of antecedent bubo in 11 males and in 1 female. In 10 of the male patients there was a scar indicating previous operation. The duration of the

disease varied from one month to 10 years. The average was three and half years.
 Frei's reaction.—

	Males		Females
Positive reaction ..	13	Positive reaction ..	7
Negative reaction ..	2	Test not performed	1
Doubtful reaction	1		
Test not performed	2		
TOTAL ..	18	TOTAL ..	8

Blood Wassermann reaction.—

	Males	Females
Strongly positive ..	1 case	3 cases
Positive ..	3 cases	1 case

In none of these Wassermann-positive cases was there any active clinical evidence of syphilis, and in the series among females the Wassermann-positive cases were all prostitutes.

The clinical conditions found on examination either alone or in combination are tabulated below :—

	Males	Females
Perianal ulceration ..	13 cases	5 cases
Elephantoid condition of the anal margin ..	8 "	3 "
Elephantiasis of the scrotum and penis, or labia ..	3 "	5 "
Perianal fistulæ ..	4 "	1 case
A rigid rugose, ulcerated condition of the anal canal and lower part of the rectum ..	16 "	4 cases
Stricture of rectum ..	10 "	6 "
Ulceration of labia and fourchette ..	..	2 "

Perianal ulceration.—This was found in the majority of cases. The ulcer, single or multiple, was irregular in outline, granulomatous with thickened nodular polypoid edges, usually situated in the anterior and lateral aspects of the anus and sometimes extending on to the perineum. The ulcers stop short of the anal margin.

Elephantoid condition of the anus.—Though not so common as ulceration this condition was found always associated with it. The anus is surrounded by multiple elephantoid masses of tissue covered by skin and ulcerated or scarred on their inner aspects. Often the elephantoid masses were separated by deep fissures extending on into the anus. These masses were often mistaken for piles and operations performed for their removal.

Elephantiasis of scrotum or labia.—The latter was more common and formed an important part of the genito-anorectal syndrome in women. The condition may be unilateral or bilateral, involving part or whole of the labia.

Perianal fistulæ.—These fistulæ, single or multiple, were found communicating with the perirectal space.

A rigid rugose condition of the mucous membrane of the anal canal and rectum.—This is the most characteristic lesion of the syndrome.

This lesion results from a progressive infiltration of the perirectal and anorectal lymphatics. In the early stages of the condition the mucous membrane of the rectum and anal canal is intact and non-ulcerated except the rugosity and rigidity of the wall. The perirectal inflammatory infiltration may go on to organization, resulting either in a cylindrical narrowing of the lumen or a ring-like stricture depending upon the location and extent of the lesions. Later, as a result of either trauma of hardened faeces, or secondary infection of the wall, the mucous membrane may become ulcerated. In all the cases the mucous membrane over the site of stricture was usually smooth and non-ulcerated. The ulceration was found only below the stricture. This hyperplastic inflammatory infiltration was confined to the lower 2½ to 3 inches of the bowel.

Inflammatory stricture of the rectum.—In all these cases the stricture was situated within reach of the examining finger. The distance of the stricture from the anal margin was 2 cm. in 5 cases, 4 cm. in 5 cases, 5 cm. in 4 cases, 6 cm. in 1 case and 8 cm. in 1 case, thus the majority of the strictures were situated between 2 and 6 cm. from the anus.

Character of the stricture.—In 13 cases the stricture was ring-like and in three cases it was cylindrical; the latter were all in males. In all cases but three, the tip of the index finger could be passed with a little difficulty. The mucous membrane over the stricture in all the cases was intact and non-ulcerated. The mucous membrane of the bowel proximal to the stricture was felt to be normal, soft and supple, in all cases except one.

Symptoms of anorectal syndrome.—A history of passing blood and pus from the rectum was the commonest complaint. An increasing difficulty in defæcation was observed in cases with stricture. Rectal tenesmus alternating constipation and diarrhoea, a sensation of imperfect emptying of the bowel were some of the other symptoms. It is remarkable how in some of the cases of almost impassable strictures the patients have been going on for years without symptoms of intestinal obstruction. The general health of the patients was satisfactory. There was no cachexia or emaciation.

Diagnosis.—The following points are helpful in the diagnosis of this condition :—

1. History of antecedent bubo.
2. Frei's positive reaction.
3. The long duration of the disease.
4. The clinical peculiarity of the syndrome as regards the site and extent of lesions.
5. A negative Wassermann reaction (in many cases) and the absence of any response to anti-syphilitic treatment.

Treatment.—The patients could not be kept under observation for a length of time sufficient to determine definitely the results of treatment.

In early cases of the syndrome with commencing stricture the injection of Fouadin combined with a regular passage of rectal bougies have produced encouraging results in our hands. Solganol B (watery) was tried in a few of the cases with satisfactory results, but the patients were lost sight of after they got a little better. In long-standing cases of stricture complicated by perirectal fibrosis, fistulae, etc., nothing short of surgical ablation of the diseased part of the bowel preceded by a colostomy would seem to be of any avail.

Illustrative cases

VI. Hindu male, aged 16, of a feminine type. Confessed to having been a victim to sodomy (passive agent). Complained of ulcer in anus of one month's duration. Developed small painful bubo on both groins fifteen days after the ulcer appeared in the anus.

Condition on admission (26th October, 1933).—No penile sore or scar. No urethral discharge. A small fluctuant bubo at the extreme outer end of both groins. Other glands in the groins were not palpable. An irregularly oval ulcer with thickened edges and granulomatous base situated in the right anal margin. Right iliac glands were palpable and hard. Rectal examination revealed nothing abnormal either in the anal canal or rectum. Frei's test was strongly positive. Wassermann and Dmelcos' tests were both negative. He had a course of solganol B injections. The ulcer did not show any sign of healing. Then he was given 10 injections of Fouadin on alternate days. The buboes in the groin subsided and the ulcer in the anus showed signs of healing. The patient defaulted at this stage. He came again three months later, complaining of passing blood and pus in the stools.

Condition after three months.—The buboes in the groins have completely healed, though the glands both inguinal and iliac were palpable and painless. A thickened recently-healed scar was visible at the site of the old ulcer near the anal margin. Digital examination of the rectum was very painful and revealed a rigid, polypoid condition of the mucous membrane with a commencing ring-like stricture 5 cm. from the anal margin. Frei's test was repeated and found strongly positive. Wassermann—negative.

This is an interesting case of anorectal syndrome from several aspects.

1. The primary lesion in this case was at the anus and represented by the ulcer.

2. The lymphatic gland at the outer end of the inguinal group on both sides was secondarily infected from the anal ulcer.

3. The absence of any lesion of the rectum during the early stages (four to six weeks) of the disease.

4. The insidious development of the anorectal syndrome within a space of three months.

5. The uselessness of either solganol or Fouadin in preventing the onset of this complication though the latter might have helped to heal the primary lesion.

6. The persistent positive Frei's reaction and the repeated negative Wassermann reaction.

VII. Male, aged 27.

Previous history.—Attended the clinic in January 1932 with typical secondary syphilis and a strongly positive Wassermann. He had two courses of anti-syphilitic treatment amounting to 6 grammes of

neosalvarsan and 4 grammes of metallic bismuth during 1932. He developed jaundice during the middle of the first course and the treatment had to be interrupted for a period of nearly six weeks. He was very irregular in attendance during the second course. In January 1933, the third course of injections was started and again he was irregular in attendance and, in spite of this, his blood Wassermann was repeatedly negative after the first course of injections and still remain so. (The blood was tested six times in two years.) In July 1933, he complained of passing blood and pus in his stools. Duration two months. Examination revealed a raised indolent ulcer all round the anal margin and slightly extending into the anal canal. Rectal examination was painful and showed a rough raw condition of the mucous membrane of the rectum with no stricture or narrowing of the canal. Denied any fresh exposure to infection either natural or unnatural. Groin glands slightly palpable. No penile lesion. Frei's test was positive and Wassermann negative. In spite of the repeatedly negative Wassermann he was given the fourth course of injections (3.6 grammes of neosalvarsan and 2 grammes of bismuth), on the supposition that the rectal condition may be luetic. At the end of the fourth course the condition was distinctly worse.

Proctoscopic examination in March 1934.—A scarred area, a third of an inch proximal to the anocutaneous margin with superficial ulceration of the anus above this covering the anterior third of the rectal wall and extending from 1 inch to 1½ inches in width. Definite narrowing of the anal canal. Ulceration and scarring of lymphogranuloma inguinale. Frei's test was repeated and was still positive. Wassermann—negative. The patient is attending the clinic and receiving Fouadin injections and dilations with rectal bougies.

VIII. Hindu male, aged 34 years, married.

Previous history.—Had gonorrhoea in 1921 and bubo in 1922. Underwent an operation for the latter in one of the city hospitals in Madras. In 1923 he noticed he was passing blood in the stools. The condition was diagnosed as anal fissure and was operated on at Bangalore. Since then the anal ulcer has not healed. In June 1933 he had another operation for fistula-in-ano in this hospital.

Condition on admission (November 1933).—A linear deep scar in the left groin. No penile sore or scar. No urethral discharge. Glands of the groin were not palpable. An irregular indolent granulomatous ulceration involving the perianal region and extending for nearly 1½ inches along the perineum. The edges of the ulcer were thickened and nodular. Digital examination of the rectum revealed a very tight almost impassable stricture 5 cm. from the anal margin. The mucous membrane below the stricture was rugose, rigid, and ulcerated. Frei's test was strongly positive and Wassermann negative. Pathological examination of a section from the rectum was reported as chronic, inflammatory and characteristic of lymphogranuloma.

IX. Hindu male, aged 25. Victim of sodomy 4½ years ago. Ulcer in anus. Passing of blood in stools and difficulty in defaecation of four years' duration. His condition was thought to be infective granuloma and he had received in previous years a lot of antimony injections without any benefit.

Condition on admission.—Old circumcision scar. Groin glands on both sides, palpable. Elephantoid condition of the scrotum. Extensive nodular ulceration of the perianal region, perineum and natal folds and extending into the anus and rectum. Elephantoid condition of the external parts of the anus (*vide figure 3*).

Digital examination.—A hard nodular ulcerated condition of the mucous membrane with a very tight stricture 6 cm. from the anal margin. The finger could not be passed through the stricture. Frei's test was negative

twice with an antigen of one-in-ten dilution. Wassermann was negative. The patient absconded before any further investigation could be made. The peculiarity in this case is the negative Frei's test in spite of the extensive long-standing clinically-typical condition of the anorectal syndrome.

X. Female, aged 25, a prostitute. Complained passing of blood and pus in stools. Duration 2½ years.

Condition on admission.—Scars of healed ulceration on the lower third of the labia and fourchette. Painless

the stricture was rugose and rigid. The examining finger was stained with pus and blood. Frei's test was strongly positive. Wassermann—negative. Examinations of smears from methua, cervix and rectum were negative to gonorrhoea. In this case the pathological condition was the stricture with infiltration of the wall of the rectum above the stricture which is rather unusual. She had no other manifestation of the syndrome. No information is available regarding the husband.

XII. Female, aged 25, a clandestine prostitute.

Complaint.—Ulceration of genitals and external piles. Duration 9 months.

Condition on admission.—Groin glands on both sides palpable, discrete and painless. A scar on the right groin. (History of bubo three years ago) Extensive indolent looking ulcerations on both lips of the vulva. An indurated healed scar on the fourchette. No speculum examination was done. Anal outlet surrounded by folds of skin with ulcerations in between the folds. Digital examination revealed a commencing ring stricture 4 cm. from the anal margin. The mucous membrane below the stricture felt nodular and rigid. Frei's test was strongly positive. Wassermann—negative. Tests for gonorrhoea negative. The ulcerations healed with Foudin injections and the stricture was dilated with bougies.

Elephantiasis of the vulva with or without ulceration.—There were four cases of elephantiasis of the labia with ulceration of the fourchette and vaginal wall. There was no inguinal adenitis or anorectal lesion in these cases. Both the Frei's test and the Wassermann reaction were strongly positive. The ulceration healed with antisyphilitic treatment, but the elephantoid condition remained uninfluenced. The question in these cases is whether the labial condition was due to the virus of climatic bubo or of syphilis or of both. Vulvar elephantiasis has been known to be caused by diseases other than the virus of climatic bubo. We have seen a good number of cases of elephantiasis of the vulva, secondary to infective granuloma, syphilis and filaria. In some of the cases where Frei's test was performed the result was found negative. Therefore, it is very likely that elephantiasis of the vulva in women may have a varied aetiology and should not be considered as pathognomonic of lymphogranuloma in the absence of other lesions of the genito-anorectal syndrome. A positive Frei's test in the absence of other venereal diseases is highly suggestive, but in our cases they showed a strongly positive Wassermann reaction also.

Summary and conclusions

1. This report is based on the investigation of 183 cases of climatic bubo and allied conditions during the year 1933.

2. The results of Frei's test carried out in these cases and others are given. Attention is drawn to the fact that a positive reaction may be obtained long after the entire disease has subsided.

3. The clinical features are dealt with in detail.



Fig. 3—A case of genito-anorectal syndrome (vide case IX).

discharge from the vagina and groin glands not palpable. An irregular granulomatous ulcer about 1½ inches in diameter on the left anal margin with thickened edges. Elephantoid masses surrounding the anal margin. Digital examination of the rectum revealed a rigid polypoidal and ulcerated condition of the mucous membrane with a ring-like stricture 2½ cm. from the anal margin. The stricture admitted the index finger with some difficulty. The mucous membrane on the proximal side of the stricture was normal. Frei's test was strongly positive with a diffused infiltrative erythema all round for nearly 1½ inches. Blood Wassermann positive-strong even after repetition but the patient had no clinical evidence of syphilis. Urethral and cervical smears were negative to gonococci. As the patient is a prostitute, it is quite likely that the case is one of latent syphilis with lymphogranuloma of the rectum.

XI. Female, aged 32, married.

Complaint.—Passing of blood and pus in stools 1½ years' duration. No previous history of bubo or ulcers in the genitals.

Condition on admission.—No urethral discharge. Mucoid discharge from the cervix. No ulceration nor scarring of the labia. Groin glands not palpable. External parts of the anus nothing abnormal. Digital examination of the rectum revealed a ring-like stricture 4 cm. from the anal margin. The mucous membrane below the stricture was slightly granular to the feel but was otherwise soft and supple. Stricture admitted the index finger. The mucous membrane proximal to

4. The association of climatic bubo with other venereal diseases is pointed out but it has no effect on the course of climatic bubo.

5. The question of the behaviour of Wassermann reaction in climatic bubo is discussed. In a certain proportion of cases of climatic bubo, diagnosed clinically, as well as on the basis of the Frei's test, yield a positive Wassermann reaction though there is no clinical evidence of an associated syphilitic infection. The Wassermann reaction may become negative without any antisyphilitic treatment.

6. Some points in the diagnosis of this condition are stressed.

7. Various methods of treatment employed by different workers, have been mentioned and those methods which have been carried out in this hospital have been described. Both a course of Dmeleos' vaccine and milk injection followed by Fouadin injections have proved of great value in many cases of unbroken climatic bubo. Surgical treatment is confined to aspiration wherever there is fluctuation. Partial removal of the gland is a safer method than complete enucleation as there is less risk of the occurrence of complications.

8. Various clinical manifestations of genito-anorectal syndrome have been described and its special incidence in persons addicted to sodomy is pointed out. The anorectal syndrome was found to be commoner in men than women. This finding is in contrast to that of other workers. Perianal ulceration was found to be the commonest condition. The rectal stricture which may be ring-like or cylindrical is usually situated 2 to 6 cm. from the anus. These conditions are important as their relationship with the climatic bubo virus is a recent observation, and it is believed that a great many cases of rectal stricture, elephantoid condition of scrotum and labia, etc., of erstwhile doubtful ætiology are really of this nature.

9. Five cases of climatic bubo and seven cases of genito-anorectal syndrome have been described with a view to illustrating some of the clinical features of these conditions.

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REFERENCE

Stannus, H. S. (1933). *A Sixth Venereal Disease*. Baillière, Tindall and Cox, London.

FILARIAL AFFECTIONS OF THE MALE GENITAL TRACTS

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DURING the past few years very important advances have been made in our knowledge of the pathology of filariasis and its complications. In the present review, attention is drawn to some of the more recent advances, regarding the affections of the male genital tracts.

The filarial worm (*Wuchereria bancrofti*) in its adult or mature stage is an inhabitant of the lymphatic system of man. O'Connor (1932) and his colleagues have recently brought forward convincing evidence that the filarial worm itself is the essential factor in the syndrome associated with *W. bancrofti* infection. Lymphatic filarial obstruction has been explained in terms of damage done to the main lymphatic trunks or to the corresponding lymphatic glands by the immature larvæ or adult worms. But evidence has gradually accumulated that adults may live in numbers in the smaller lymphatics of the limbs and on the distal side of lymphatic nodes. The conditions then are such that so long as the lymph circulation remains reasonably normal every microfilaria from these adults must pass through the nodes concerned and the passage will induce a considerable cellular reaction in them. Persistent passage of embryos is then likely to be followed by fibrosis and lymphatic obstruction (Lane, 1931). If the length of the testicular lymphatics and their termination in the juxta-aortic lymph glands are kept in mind, it would not be difficult to understand the pathological changes that occur. In the following pages an attempt will also be made to consider the factors that determine the differences in the type of genital lesions.

Lymphatic varix of the cord or lymphatic varicocele

This is very frequently the earliest, or the only manifestation of the filarial infection of the male genital tract. The condition deserves careful attention because of its liability to lead to more serious complications and for its being mistaken for a bubonocoele.

Clinically, the patient may complain of a thickening of the cord but usually it is characterized by the absence of any symptoms. If an early diagnosis is made, it is usually during a routine examination of a patient. It resembles a varicocele in its fullness of the cord and in imparting the sensation of a 'bag of worms' but it is differentiated by the fact that it does not readily disappear when the patient lies down. The maximum fullness of the cord is noticed towards the evening and it almost disappears in the morning after a night's rest.

Although an impulse may be present on coughing, little difficulty will be found in differentiating the condition from an inguinal hernia or bubonocoele, if the characteristic features are recognized. It is, however, necessary to point out that, in about 5 per cent of cases, a lymphatic varix is associated with a bubonocoele. It may also be mistaken for a diffuse hydrocele or lymphangioma of the cord. In case of doubt, examination of the aspirated fluid may reveal microfilariæ or chyle. The parent worm and microfilariæ are usually present in these varicose lymphatics or in close proximity to them.

Excision of the lymphatic varix is not justified as the risk of cellulitis or the persistence of a chyloous fistula is very real. In this connection, it is of interest to mention that a case of lymphatic varix of the groin was successfully treated by the writer with local injections of sodium morrhuate solution (B. D. H.). The semi-fluctuating swelling was converted into a firm solid mass, without giving rise to any lymphatic edema of the lower extremity.

Endemic funiculitis

This condition may be acute, subacute, and chronic or recurrent. The acute type usually ends in a septicæmia and, clinically, it is so well known that no further description is needed. On culture of pus, streptococci, *B. coli*, etc., are commonly obtained. The condition starts as a lymphangitis of the cord, the severity of which is due to a secondary bacterial infection. Thrombosis of the pampiniform plexus is usual. This condition is associated with a high rate of mortality (50 to 75 per cent).

With regard to the subacute, chronic or recurrent types, the prognosis is better. It is commonly associated with a nodular epididymo-orchitis. Owing to the presence of a painful inguino-scrotal swelling, absence of an impulse on coughing, vomiting, abdominal pain and constipation, it is not always easy to differentiate the condition from a strangulated inguinal hernia. In case of doubt it is best to operate. With regard to termination, the condition either subsides or ends in suppuration.

In a recent case, suppuration was noticed within the inguinal canal and along the spermatic cord in association with thrombosis of the lymphatics and pampiniform plexus. The testicle was found to be hard in consistency and much enlarged, but the associated hydrocele was not infected. No microfilariæ were present in the peripheral blood. The blood count was also interesting, the total white cell count being 10,600 per c.mm. and the percentage of eosinophil cells nil. On culture of the pus, *B. coli* and *B. proteus* were obtained. The complement-fixation test was positive. The patient made an excellent recovery.

Hydrocele

It is well known that a hydrocele of the tunica vaginalis may be secondary to some disease of the testis or epididymis, e.g., gonococcal epididymo-orchitis. An effusion into the tunica vaginalis may also be due to obstruction to venous or lymphatic flow, or may be the result of irritation of the lining membrane itself. In the majority of cases in this country the so-called idiopathic or primary hydrocele is filarial in origin. This statement is based on the following facts:—

1. In nearly 10 per cent of cases, the hydrocele fluid contains microfilariæ (Rao, 1931).

2. Adult filariæ have been found in the tunica vaginalis in a large number of cases.

3. Lymph varix of the cord and endemic funiculitis are usually followed by a hydrocele.

4. The presence of bilateral hydroceles in case of scrotal elephantiasis is rather the rule than the exception.

5. In cases of long standing, nodular epididymo-orchitis is present, and mature filariæ, dead or living, have been found mostly in the epididymis. Sections of small nodules show eosinophil granulation tissue.

6. Hydroceles are found to be very common in filarial areas and rarer in non-endemic areas.

Observations by Brug (1931) in the Dutch East Indies confirm Korke's statement (1929) that the 'typical forms' of microfilaria seem to be more associated with affections of the genitalia and the 'atypical forms' more with elephantiasis of the limb. The atypical form of the microfilaria of *W. bancrofti* of Korke appears to be identical with those of *W. malayi* of Brug. From the morphology of the embryo filaria and its development in a particular mosquito, this latter is undoubtedly a distinct species. The adult filaria, however, has not yet been discovered. It is necessary to point out that Acton and Rao (1930) have not mentioned any such morphological differences. According to them, in hyperendemic region the first glands through which the larvæ pass are subjected to repeated trauma and are severely damaged; this results in elephantiasis, usually of the leg; while, in regions of low endemicity, the larvæ pass through the glands in the limbs and reach the juxta-aortic group of lymph glands which they damage and the result is lymph varix of the cord, hydrocele and chylocele.

The operation for radical cure of hydrocele is regarded as an item of minor surgery. Of the late complications that may occur, the following are of importance from our point of view, e.g., scrotal or penile elephantiasis, lymph scrotum and chronic epididymo-orchitis.

Chronic epididymo-orchitis or fibrosis of the testis

In the literature on genital filarial affections, little attention appears to have been paid to this condition. It is obvious that the investigation

of the pathological relationship of the filarial worm to chronic enlargement of the testicle is beset with many difficulties. A case recently described by the writer is unique in several respects (Ray, 1934), and throws some light on this obscure condition.

Clinically, the condition is seen—

- (i) with or without scrotal elephantiasis,
- (ii) in association with a hydrocele of the tunica vaginalis,
- (iii) with partial or complete occlusion of the vaginal sac, or
- (iv) with a lymphatic varix of the cord,

or the condition may persist for years after an operation for the radical cure of hydrocele or scrotal elephantiasis.

These facts and the pathological findings clearly demonstrate the filarial origin of this condition. A summary of the pathological appearances of the case, described by me, is given here:

The epididymis was comparatively more enlarged than the body of the testis, and, on section, the former presented a homogeneous necrotic mass in its centre. Microscopically, sections of adult female worms and numerous embryos contained within the uterus were seen within the dilated lymphatics under the tunica albuginea (plate XI, figs. 1 and 2). The sections, through the body of the testis, showed scattered areas of round-cell infiltration with a varying number of plasma cells and fibroblasts in the interstitial tissues and in the neighbourhood of the seminiferous tubules (plate XI, fig. 6). Atrophy of the tubular epithelium and fibrosis were noted in certain areas. No endarteritis obliterans was noticed: contrast this with plate XI, fig. 7. The epididymis presented an interesting picture. It contained a mass of necrotic material which had undergone hyaline degeneration (plate XI, fig. 3). Sections of degenerating adult filaria could be identified. This area was surrounded by a zone of round-cell infiltration with some admixture of plasma and eosinophil cells and foreign-body giant cells (plate XI, fig. 5). This picture resembled that of a caseating tubercle, but no tubercle bacilli could be demonstrated. Blood vessels did not show any endarteritis obliterans or perivascular infiltration. As no evidence of secondary pyogenic infection could be discovered, the conclusion was reached that the adult filaria was the real or essential cause of the pathological changes in the testicle. They vary at different levels (plate XI, figs. 1, 2 and 5). The presence of eosinophil cells is most marked near the vulval end of the worm, because of the discharges of the embryos and uterine fluid which act as irritants (plate XI, fig. 2).

It is of interest to note that if the test tube containing a specimen of blood is left undisturbed for a few hours, the microfilariae appear

to huddle together into a bunch, and, if they are nearly dead, leucocytes are found adhering to them. This phenomenon appears to take place also *in vivo*. According to O'Connor (1932), the remains of the dead parasite are shut off like a foreign body from the neighbouring tissues in a 'cocoon-like case' of hyaline material. Eventually, the whole area becomes fibrosed. Such is probably the ultimate fate of the testicle, if it escapes suppuration.

With regard to diagnosis, this condition has to be differentiated from (1) a new growth of the testicle, (2) syphilitic orchitis or gumma, (3) haematocoele and especially at an early stage from (4) tuberculous or *B. coli* epididymo-orchitis. The most important diagnostic signs are the comparatively greater enlargement of the epididymis, the presence of testicular sensation, lymph varix of the cord and the history of recurrent attacks of testicular pain with successive increase in size or lymphangitis of the scrotum. Microfilariae or chyle may be present in the aspirated fluid from the sac of the tunica vaginalis. During the later stages, especially after suppuration has occurred, it is likely to be mistaken for a breaking down gumma. Gonococcal infection may be excluded by negative prostatic smears. Clinically, it is very difficult to differentiate the early case from tuberculous epididymo-orchitis, and many testicles have been removed in error. But two clinical features may be helpful in the diagnosis. If the testicle is examined towards the evening, a lymphatic varix of the cord will be seldom missed, and, secondly, if the patient is interrogated with tact and sympathy, the history of the occurrence of post-coital testicular pain will usually be forthcoming. When in doubt, rest in bed for a few days and the use of a suspensory bandage are advisable. In case of filarial disease, the epididymis suffers more than the testis, and occlusion of the ductuli efferentes or the duct of the epididymis causes retention of the contents of the seminiferous tubules. This type of pain is probably due to increased tension and congestion of the testicles which will ultimately induce chronic inflammation and fibrosis. Unfortunately, this condition is frequently bilateral and in consequence sterility appears to be a common sequela.

Complete obstruction of the ductus deferens does not, as one might suppose, cause atrophy or diminution in the size of the testis, and in this condition the testicle may actually increase to an enormous size. In the light of the pathological findings, described above, it appears reasonable to conclude that the inflammatory reactions are mainly due to the presence of the adult filariae and their embryos. The fate of such a testicle may be suppuration, degeneration or fibrosis. The latter change appears to occur after organization of the remains of the dead filaria. The diagnosis of a fibrotic testicle (plate XI, fig. 8) of this type is very difficult.

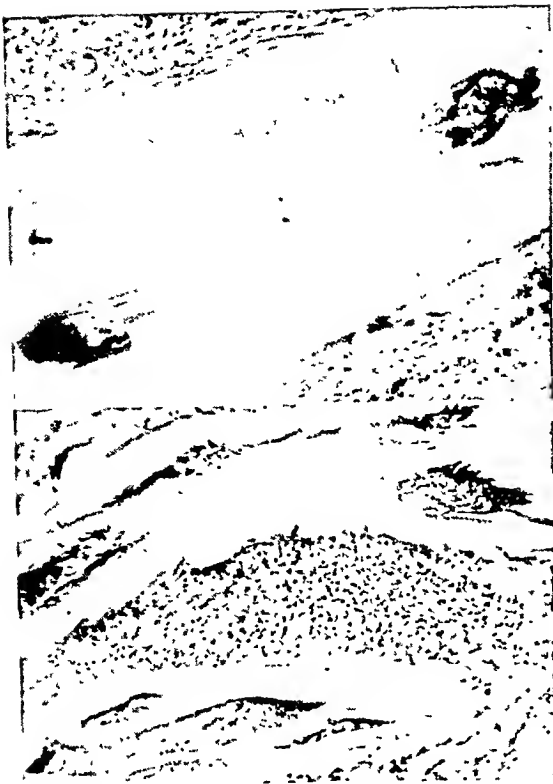


Fig. 1.—(Upper). Note the scanty cellular reaction, around the dilated lymphatic, containing sections of adult worm. (1/6 by 2 Zeiss).

Fig. 2.—(Lower). Showing oblique sections of an adult female filaria, containing numerous microfilariae within the uterus. Note the cluster of eosinophil cells. (1/6 by 2 Zeiss).

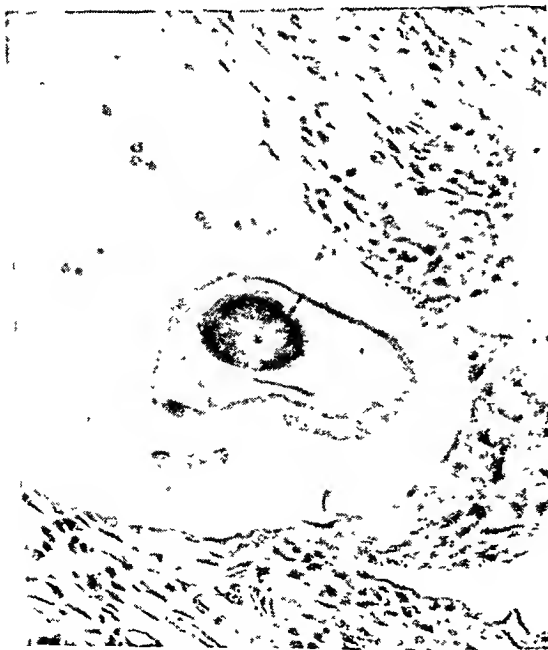


Fig. 5.—Section of adult worm within a dilated lymphatic of the testis. Note the ovary contained within the uterus. (1/12 by 2 Zeiss).

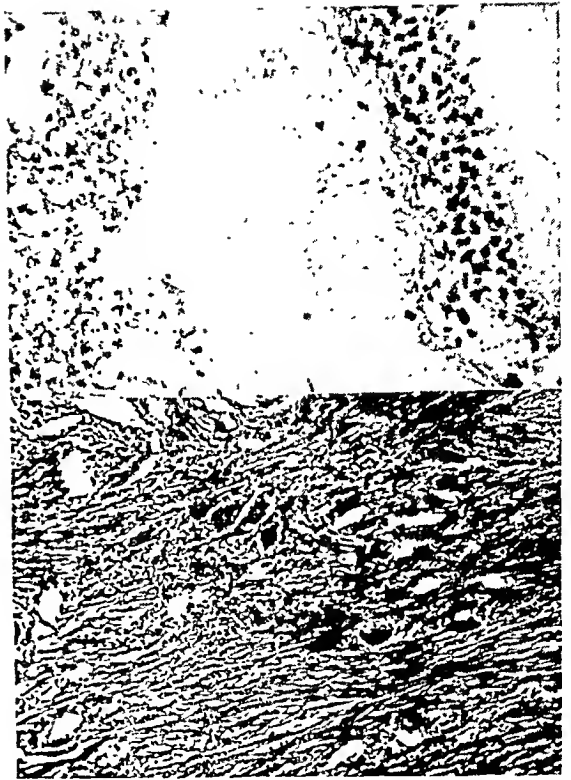


Fig. 3.—(Upper). Showing hyaline degeneration of epididymis. (1/6 by 2 Zeiss).

Fig. 4.—(Lower). Section of epididymis. Note the giant cells. (2/3 by 2 Zeiss).



Fig. 6.—(Upper). Showing cellular reactions in chronic epididymo-orchitis (filarial). (2/3 by 2 Zeiss).

Fig. 7.—(Middle). Syphilitic orchitis, showing characteristic changes. Note endarteritis obliterans. (6L by 12X Leitz).

Fig. 8.—(Lower). Fibrosis of testicle (filarial). (2/3 by 2 Zeiss).

Microscopically it is differentiated from a new growth by the signs of chronic inflammation and fibrosis, particularly around the seminiferous by the absence of endarteritis obliterans (plate XI, fig. 7). A negative Wassermann reaction will not exclude the possibility of syphilitic orchitis. The therapeutic test may be given a trial to see its response to treatment.

With regard to the laboratory tests, a few words are necessary. When positive, these are of value, but the examination of the peripheral blood for the presence of microfilariae is a test on which much reliance cannot be placed. During an attack of lymphangitis, microfilariae tend to disappear from the blood. Similarly in an early case, when there is no lymphatic obstruction, there is a constant high eosinophilia indicating a leakage of toxin into the peripheral blood. When lymphatic obstruction is complete, as in elephantiasis, the eosinophil count is practically normal.

Elephantiasis of the scrotum and penis

The pathological changes associated with lymphatic stasis, oedema and elephantiasis have been considerably elucidated; it is, however, not quite clear why the adult filariae should be present in the spermatic cord and epididymis in such large numbers. It appears that as a result of lymphatic blockage at a higher level, e.g., pre-aortic group of glands and cysterna chyli, aberrant migration of the adult worms takes place into these organs. It has also been suggested that the use of the lymphatic or the blood 'escalator' by the infective larvae (Lane, 1932), and the local suitability of the tissues are two important factors on which the distribution of the disease is dependent. According to Romiti (1933), the cord is the habitat of the fertile adult in most cases. It has also been suggested that the genital tracts are attacked by a different species of filaria. An important fact which is very often overlooked is that the filarial affections of the male genital tract occur after puberty during a period of increased vascularity of the parts associated with sexual maturity and activity. It is in favour of the 'theory of blood escalator'. The youngest patient that I have seen suffering from serotal elephantiasis was between 14 and 15 years of age. According to Iyengar (1933), the earliest age for the presence of microfilaria in the peripheral blood is 2½ years, for occurrence of lymphangitis 8 years, and for elephantiasis of the leg 11 years.

What are then the causes of the comparative immunity of children from elephantiasis? No proof is available in support of natural immunity. It is more likely that the immature larva in its passage along the lymphatics or the lymph gland is held up and is either imprisoned or destroyed by an active cellular reaction. The absence, or certainly the extreme rarity, of genital elephantiasis in childhood is possibly due

to the absence of vascularity of the parts and their non-development before puberty.

It is now generally recognized that the tropical elephantiasis is frequently not caused by filaria. The reason for the greater frequency of elephantiasis nostra in the tropics is the greater exposure of the skin to infection. Kuntzen, who writes from Payer's clinic, believes that lymphatic obstruction plays the major rôle, the crsipeloid streptococcal infection being secondary and acting only to intensify the course of the disease (Muller and Jordan, 1933).

Lymph serotum

Clinically, lymph serotum is differentiated from serotal elephantiasis by its reddish-brown colour, thick and velvet-like integument, and by the presence of vesicles or small cysts, either discharging or encrusted. The discharging fluid may be clear or chylous and may amount to several ounces in 24 hours. It may continue for several days causing great prostration and locally giving rise to an eczematous condition of the skin.

With regard to the mechanism of lymph serotum, Aeton and Rao (1930a) have pointed out that it usually occurs after an operation for radical cure of hydrocele. I have also seen cases in which lymph serotum has appeared after operation for serotal elephantiasis, after radical operation for inguinal hernia, and after excision of lymphatic varix of the cord, respectively. The treatment is unsatisfactory. With rest in bed and local applications, the discharge of fluid usually ceases for a time. In one case, local x-ray therapy during the quiescent period proved very beneficial.

Causes of inflammatory reactions

Authoritative opinion is still divided on this subject. There is no doubt that inflammation or suppuration is common in genital filarial affections because of the liability of the parts to chafing, intertrigo or scabies. Recent investigations tend to show that inflammatory reactions are probably due to the liberation or production of toxic substances during the process of disintegration and absorption of the dead worm. The part played by the microfilarial periodicity regarding passage and destruction of the embryos is yet to be clearly defined. In my personal experiences, in many cases no evidence of secondary infection could be obtained. Giglioli (1933) states that he has never obtained a positive culture from serum drawn by puncture from the inflamed tissues of uncomplicated typical filarial lymphangitis and lymphadenitis, when these have not progressed to suppuration. In some cases even the smear proved negative and the culture remained sterile.

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STREPTOCOCCAL SEPTICÆMIA AND FILARIAL ORCHITIS

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STREPTOCOCCAL SEPTICÆMIA is usually due to the hæmolytic strain. The organisms of this group give rise to lesions which are less localized, tend to spread and are more often fatal than those caused by other pyogenic bacteria. It was Rosenbach who, in 1894, first pointed out the above characters of the streptococcal lesions. The severity of a streptococcal infection depends on two factors, viz. (i) the invasiveness of the microbial strain, i.e., its virulence and toxigenic properties, and (ii) the local and general resistance of the individual host. The remarkable property of spreading and invasiveness can be

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Summary

In this paper, the recent advances in our knowledge regarding filarial affections of the male genital tracts have been discussed and reviewed. In particular, attention has been drawn to a condition, which has been described as chronic epididymo-orchitis, or fibrosis of the testicle of filarial origin. Clinically, and pathologically, its filarial origin has been demonstrated. The ultimate result is suppuration, degeneration, or fibrosis. The diagnosis of a fibrosed testicle of this type is very difficult, if other manifestations of filarial infection are not present.

My best thanks are due to Lieut.-Colonel R. N. Chopra, I.M.S., the officiating director, and to Dr. Sundar Rao, the filariasis research worker, of the Calcutta School of Tropical Medicine, for their kindness in giving me every facility for my work.

REFERENCES

- Aeton, H. W., and Rao, S. S. (1930). *Indian Med. Gaz.*, Vol. LXV, p. 620.
Aeton, H. W., and Rao, S. S. (1930a). *Ibid.*, Vol. LXV, p. 541.
Brug, S. L. (1931). *Proc. Roy. Soc. Med.*, Vol. XXIV, p. 663.
Giglioli, G. (1933). *Trans. Roy. Soc. Trop. Med. and Hyg.*, Vol. XXVI, p. 379.
Iyengar, M. O. T. (1933). *Indian Journ. Med. Res.*, Vol. XX, p. 921.
Korke, V. T. (1929). *Ibid.*, Vol. XVI, p. 1023.
Lane, C. (1931). *Lancet*, Vol. I, p. 1100.
Lane, C. (1932). *Trans. Roy. Soc. Trop. Med. and Hyg.*, Vol. XXVI, p. 42.
Muller, G. P., and Jordan, C. G. (1933). *Ann. Surg.*, Vol. XCVII, p. 226.
O'Connor, F. W. (1932). *Trans. Roy. Soc. Trop. Med. and Hyg.*, Vol. XXVI, p. 13.
Rao, S. (1931). *Annual Report, Calcutta School of Tropical Medicine*, p. 118.
Ray, P. N. (1934). *Brit. Journ. Surg.* (In press).
Romiti, C. (1933). *Trop. Dis. Bull.*, Vol. XXX, p. 705.

explained by the fact that there is hardly any satisfactory mobilization of the phagocytes in this infection. Moreover, leucocidin produced by the organisms kills the phagocytes that may have aggregated at the site of the infection, particularly in its earlier stages. Finding no barrier, the micro-organisms invade the tissue spaces and the lymphatic channels with great rapidity resulting ultimately in septicæmia. It is for this reason also that the exudate from a fatal streptococcal lesion appears to be serous rather than purulent and when examined it is found to contain few polymuclear cells. When, however, definite pus has formed, the prognosis becomes better as it signifies the mobilization of the phagocytes and the formation of a protective barrier. It may be remembered that a virulent strain of hæmolytic streptococci may gain entrance through a minute skin abrasion, such as a prick or a scratch, and produce a fulminant septicæmia with hardly any inflammatory reactions at the site of entry.

This condition is known to develop from wound infections, either in the dissecting room, in the operating theatre or during an accidental injury. It may also arise from erysipelas and puerperal infection in females. In our country, a fairly common occurrence is found in acute orchitis and funiculitis in males. The last-named condition appears to be a very important cause, and, though it has been recognized for a long time, its seriousness does not seem to have been appreciated by the profession in general. It may be interesting to note that out of a series of 75 consecutive cases in the Calcutta Medical College necropsy examinations from 5th April, 1933, to 20th August, 1934, three cases have been found to be due to this condition. A short note of these cases with the important post-mortem findings may be of interest.

Case 1.—Clinical diagnosis: meningitis.

Hindu, male, aged 27, was admitted on the 10th May, 1933.

Condition on admission.—Unconscious and very toxic with cerebral symptoms; temperature—104°F.; respiration—32 per minute; pulse—very rapid and almost imperceptible. Left scrotum was acutely inflamed and contained fluid. Hydrocele on the right side. Crepitant râles were present in both the lungs. Spleen just palpable. Blood examination showed leucocytosis. *Streptococcus hæmolyticus* was isolated on blood culture. Patient died 16 hours after admission. Duration of illness—2 days.

Post-mortem findings.—Acute orchitis on the left side with fibrino-purulent fluid inside the tunica vaginalis. Small foci of suppuration were present along the structures of the spermatic cord, extending up to the abdominal cavity. Posterior abdominal vessels intensely congested and lymph glands enlarged. Hemorrhagic turbid fluid in all the serous cavities. Cerebral vessels injected. A pair of adult filariæ were found in one of the dilated lymphatic vessels along the spermatic cord.

Bacteriological examination.—Materials taken from the serotal fluid and splenic pulp showed chained cocci. Cultures from the above and from the heart's blood showed *Streptococcus hæmolyticus* (β type of Smith and Brown) which grew well both under aerobic and anaerobic conditions.

PLATE II

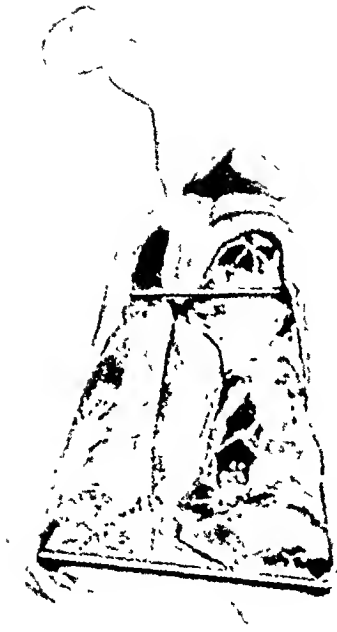


Fig. 1.—Infection with *Streptococcus hemolyticus* in filarial orchitis. The testis, which is situated in the centre, is cut open and exposed. The cavity of tunica vaginalis contains masses of fibrin. Microfilariae and *Streptococcus hemolyticus* were found in the exudate.



Fig. 2.—An early acute bacterial endocarditis of the pulmonary semilunar valves. Vegetations are small and nodular and situated at the line of apposition. They have not yet shown any signs of breaking down or ulceration.

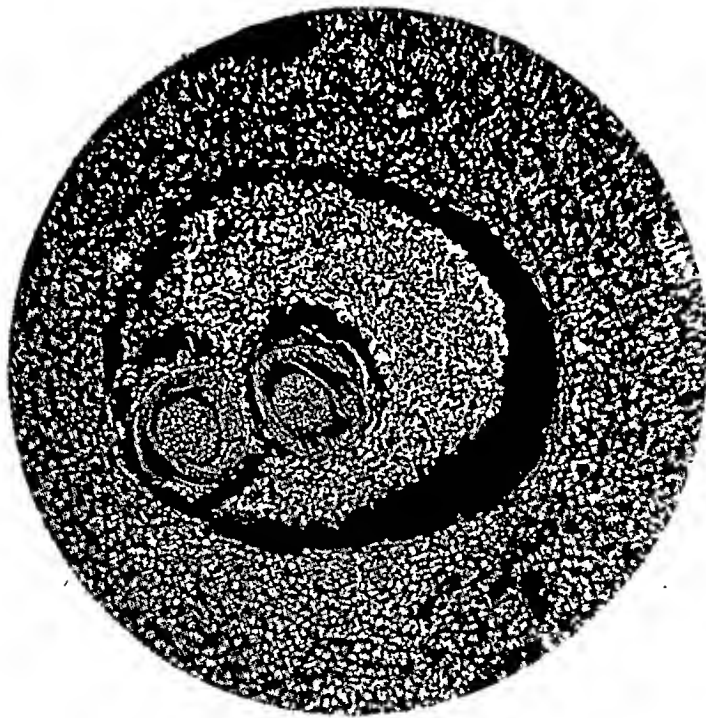


Fig. 3.—Photomicrograph of a section of a lymph gland, showing a pair of adult filariae in a lymphatic space. There is a mass of inflammatory cells along with the parasite.

Case 2.—Clinical diagnosis—septic pneumonia.

Hindu, male, aged 17, was admitted on the 22nd May, 1934, complaining of pain and swelling of the right testis for the last 8 days and high fever for the last 5 or 6 days.

Condition on admission.—Very toxic, jaundiced and cyanosed; temperature—103°F.; pulse—120 per minute; respiration—30 per minute. The right testis was swollen to about four times the normal size. The left testis was normal with tenderness and fluctuation. Tongue—dry and coated. Liver and spleen—not palpable. Heart—nothing abnormal detected clinically. Lungs—rhonchi and crepitations in the right lung and crepitant râles in the left.

Blood culture showed *Streptococcus hæmolyticus*.

Blood examination on the 23rd May, 1934. Total white cells—10,500, polymorphs 82 per cent, small mononuclears 16 per cent, large mononuclears 1 per cent, eosinophils 1 per cent.

Culture from hydrocele fluid showed pure growth of *Streptococcus hæmolyticus*.

Patient died 4 days after admission, i.e., after 12 days of illness.

Post-mortem findings.—Right testis was swollen with fluid inside; no external wound was present; skin not adherent; inguinal glands were not grossly enlarged.

The cavity of the tunica vaginalis was filled with greenish, tough, masses of fibrin (plate XII, fig. 1) with a small amount of slightly cloudy fluid. The surface of the testis was covered with a bright-red hæmorrhagic exudate and the substance of the gland looked congested. The inflammatory features were found to extend upwards along the structures of the cord which was swollen, congested and covered with fibrin.

In the peritoneal cavity, all the posterior abdominal blood vessels were standing out very prominently and were of a dark crimson colour. This condition was present up to the attachment of the diaphragm. The inguinal and para-aortic lymph glands were swollen, enlarged and markedly congested.

Lungs.—In the right lung there was a small abscess at the base of the upper lobe and patches of consolidation over the base of the lower lobe. There was about 9 ounces of fibrino-purulent hæmorrhagic fluid in the right pleural cavity. The left lung was congested and œdematous but there was no consolidation.

Heart.—Small vegetations were found on each of the pulmonary semilunar valves (plate XII, fig. 2) at their lines of apposition. Other valves were normal.

Spleen.—The organ was enlarged (500 grammes). It was congested, soft and diffuent, resembling a typical septicemic spleen.

Liver and kidneys—congested.

Bacteriological investigations.—Smears from the hydrocele fluid and splenic pulp showed chained cocci (streptococci). Cultures from heart's blood, pleural exudate, splenic pulp and hydrocele fluid showed typical colonies of *Streptococcus hæmolyticus*, both under aerobic and anaerobic conditions.

An interesting feature of the finding from the hydrocele fluid was the presence of microfilariae.

Histological examination.—Microsection of the inguinal lymph gland showed a pair of adult filariæ (plate XII, fig. 3).

Case 3.—Clinical diagnosis—acute general peritonitis.

Hindu, male, aged 18 years, was admitted on 9th August, 1934.

Condition on admission.—Restless; condition low; jaundice present; pulse—very low, rate—123 per minute; respiration—40 per minute; temperature—101°F.; left scrotum was acutely inflamed. Abdomen distended and tender.

Culture of hydrocele fluid obtained by puncture showed pure growth of *Streptococcus hæmolyticus* (β type of Smith and Brown). The latter organism was also isolated from the blood.

Patient died two days after admission.

Post-mortem findings.—Suppurative orchitis on the left side, purulent peritonitis, bilateral plastic pleurisy;

purulent on the left side. Lungs—œdematous and congested.

Bacteriological investigations.—Hæmolytic streptococci found in smears, as well as in cultures from scrotal pus, heart's blood, spleen pulp, peritoneal and pleural fluids. The growth of the organism was luxuriant, both under aerobic and anaerobic conditions.

Microfilariae were also found in the hydrocele fluid.

Comments.—Streptococcal infection of the testis and the epididymis is very common in our country and is often fatal. In most of the cases, filarial infection is also present, with or without any active manifestations of the disease. The condition is ushered in by an acute attack of lymphangitis or an inflammation of the testis and epididymis, associated with a sharp rise of temperature, with chill and rigor. The parts become intensely painful and tender. A very marked degree of toxæmia is commonly present. Within 3 or 4 days, all the features of a grave septicæmia supervene and the patient succumbs. In such a case, if a blood culture is done, hæmolytic streptococci will always be isolated. When the resistance of the individual is very strong, the acute process passes into a subacute stage with localization of the infection and formation of an abscess inside the tunica vaginalis.

The gross appearance (*vide* plate XII, fig. 1) of such a fulminant streptococcal infection is very constant and characteristic. The cavity of the tunica vaginalis is filled by a fibrinous mass, with varying amounts of slightly cloudy fluid in the dependent part, the surfaces of the tunica showing hæmorrhages. The epididymis and the cord are equally involved and are considerably thickened, being infiltrated with a similar type of exudation. The process is not limited to the scrotum, but is found to extend along the structures of the cord into the abdominal cavity and the acute congestion, hæmorrhage and fibrino-purulent exudate may be traced along the retro-peritoneal lymphatics and blood vessels, on either side of the vertebral column up to the pillars of the diaphragm. All the lymphatic glands in the inguinal and para-aortic regions are enlarged, swollen and intensely congested.

In the acute stage, the fluid withdrawn from the tunica vaginalis by puncture with a syringe and needle shows a very high albumen content with little or no cellular exudate. As the process becomes subacute or chronic, large numbers of pus cells appear in it. Microfilariae are often found in such a fluid. The writers have frequently demonstrated microfilariae in the hydrocele fluid and adult filariæ in the dilated lymphatic varices, as well as in the lymph nodes (*vide* plate XII, fig. 3) of such cases. The streptococci which have been isolated from such cases are always of the hæmolytic type and grow well, both under aerobic and anaerobic conditions. As the organisms do not usually inhabit the human body, one would surmise that the source of infection must usually be exogenous, but in some cases it is undoubtedly

endogenous. In the present series of cases, so far as we have been able to gather, there is no history to suggest any exogenous infection. The source of the organism thus becomes a debatable subject and requires further investigation.

Secondary localization.—Usually very few localized lesions are found in association with acute streptococcal septicaemia. In our present series of cases there were foci in the lung and heart. Case 2 is of particular interest because of the localization of the lesion in the pulmonary valves. Acute bacterial endocarditis arising in the course of a streptococcal septicaemia usually develops in the left side of the heart (mitral or aortic). It is the usual belief that all the diseases acquired during extra-uterine life involve the cardiac valves of the left side of the heart because they bear the greatest strain, whereas those acquired in the intra-uterine life involve those in the right side. This present case, though an extremely rare condition, shows that acquired lesion may develop on any of the cardiac valves, but the factor that decides the choice requires to be investigated. Furthermore, it is known that in acute bacterial endocarditis the organism settles particularly on damaged valves; but the pulmonary valves in this case did not show any evidence of previous damage.

Such a generalized infection with *Streptococcus haemolyticus* following upon acute orchitis and funiculitis is very common in our country.

The finding of the microfilariae in the hydrocele fluid brings up the question of the relationship of this streptococcal infection to the presence of filariae. This aetiological connection is not yet clearly understood. It is now accepted as an established fact that filarial infection in males usually remains localized in the scrotum, testis and epididymis as well as in the structures of the cord. It is curious that the streptococcal lesion also develops in the same places where the filariae have already localized.* It

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[* Acton and Sundar Rao (1929), after studying a number of cases of filarial lymphangitis, were able to show that secondary infection may be either endogenous or exogenous; in the former case the infection comes from the gums, teeth, tonsils, or gut. In a case reported separately these writers (1929a) recovered the same organism, a haemolytic streptococcus, from the abscess and from an infected tooth of the patient.

Acton and Rao (1929b) have also pointed out that in every case the worm produces a 'kataphylactic' condition of the tissue, which then becomes infected with some secondary organism, either a staphylococcus, in which case the infection will be localized, or a streptococcus, when a generalized infection is more likely to follow.

REFERENCES

Acton, H. W., and Rao, S. S. (1929). *Indian Med. Gaz.*, Vol. LXIV, p. 421.

Acton, H. W., and Rao, S. S. (1929a). *Ibid.*, Vol. LXIV, p. 631.

Acton, H. W. and Rao, S. S. (1929b). *Ibid.*, Vol. LXIV, p. 601.

EDITOR, I.M.G.J

ON THE CONCENTRATION OF QUININE IN THE BLOOD AFTER INTRAVENOUS AND INTRAMUSCULAR INJECTIONS

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THE object of this investigation is not to establish the superiority of any of the routes of administration of quinine over the others, but to determine whether or not there is any difference in the concentration of quinine attained in the blood when the two more commonly used parenteral routes are employed, and incidentally

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may be reasonably inferred that the association of the two infections must be very intimate. What is the exact scientific basis of this mutual relationship has not yet been fully worked out. It may be that under normal conditions both the organisms remain in the area in a condition of symbiosis and it is the sudden disturbance of this mutual control which may be responsible for the acute attack. Or it may be that the filarial worms only make the soil suitable for the growth of streptococci, either by their irritant action as foreign bodies, their toxin or by producing some alteration in the tissue environments by an as-yet-undetermined factor.

Summary

(1) The peculiar nature of the pathogenesis of haemolytic streptococci renders the organisms prone to get into the general circulation and cause septicaemia.

(2) In our country, such a septicaemic condition is often found to arise from an acute orchitis and epididymitis and is intimately associated with a previous filarial infection.

(3) The haemolytic streptococci isolated from such cases either from the blood or from the infected tissues grow luxuriantly both under aerobic and anaerobic conditions.

(4) The morbid anatomy of three such cases obtained recently from the Calcutta Medical College Hospitals has been described.

(5) A very unusual localization of the organisms with acute bacterial endocarditis of the pulmonary valves has been described.

(6) The rôle of the filarial infection in the causation of fulminant streptococcal septicaemia, though very definite, is not yet fully understood.

For clinical notes of the cases we are indebted to Lieut.-Col. J. C. De, I.M.S., Capt. P. Ganguly, and Dr. U. N. Roy Choudhury, the physicians and surgeon of the Medical College Hospitals, Calcutta.

to compare these concentrations with that obtained by the oral method.

Without entering into any discussion regarding the possible production of tissue necrosis or other ill effects attending the administration of quinine by the parenteral routes, one is confronted with widely divergent views in the literature regarding the rate of absorption and the comparative clinical value of the administration of quinine by these different methods. For instance, statements such as 'no doubt the intramuscular method of giving quinine is far and away the best' (Kelly, 1907), and 'half a grain of quinine by hypodermic injections gives more certain results than 30 to 40 grains by the mouth' (Smith, 1911) are contrasted with others such as 'the temperature of the malarial patients takes about 12 hours longer in coming to normal when treated with hypodermic method than when quinine is given by the mouth' (Megaw, 1907), 'the absorption is slower from the subcutaneous tissue than from the mucous membrane of the gastric tract' (Scott, 1907), 'intramuscular injections are actually more slowly absorbed' (Fletcher, 1923), and 'intravenous injections can at best save only a short time in the attainment of maximum concentration in the blood' (Vedder and Masen, 1931).

Again the tardier elimination of quinine in the urine when administered by the parenteral routes, than when given orally, as reported by several authors (Kliene, 1901; Giemsa and Schaumann, 1907), is taken as an indication of the slower absorption by the former methods. MacGilchrist (1911) states that according to Mariani the total elimination of quinine in the urine during four days after its administration is intravenous 27.94 per cent, intramuscular 35.43 per cent, and oral (fasting) 40.80 per cent. In this connection the following remarks of Clark (1934) may be fittingly quoted: 'quinine sulphate which is insoluble and quinine bihydrochloride which is soluble are excreted in the same quantities and about the same rates. The amount of quinine excreted and the rate of its excretion are nearly the same whether the drug is given by the mouth, intramuscularly or intravenously'.

As regards the concentration of quinine attained in the blood when administered by these different routes, there is also no unanimity of opinion. Morgenroth (1918) for instance found that the quinine content of the blood was 1 in 20,000 a few minutes after intravenous injections and 1 in 150,000 after oral administration of therapeutic doses. Disappearance of the drug from the blood was found to be very rapid. Hatcher and Gold (1927) on the other hand could not detect its presence in specimens of blood drawn after a few minutes of oral, intravenous or intramuscular administrations.

The literature on this subject has been ably reviewed and summarized by Karamchandani (1933).

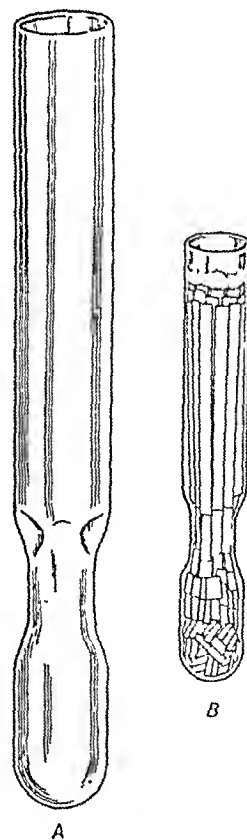
Methods of quinine estimation

Formerly the concentration of quinine in the blood was determined by the method described by Ramsden and Lipkin (1918). In this method the blood was extracted several times with hot saturated acid ammonium sulphate solution and the quinine was extracted from this solution by means of ether after alkalization with concentrated ammonia. The quinine left as residue on evaporation of the ether extracts was dissolved with saturated ammonium sulphate solution in a boiling brine bath, cooled and the turbidity produced on the addition of Tauret's reagent compared against several sets of standard quinine solutions similarly treated. Acton and King (1921) followed mainly the procedure described by Ramsden and Lipkin with some important modifications. They suggested that the concentrated ammonia used for alkalization must be specially purified to get rid of the pyridine bases, almost invariably found in ammonia, as these bases also produce a turbidity with Tauret's reagent and their presence will lead to incorrect results. Ramsden and Lipkin's method was laborious and time-consuming and even with the improvement effected by Acton and King there was an average error of 25 per cent.

Vedder and Masen (1931) dispensed with the use of ammonia altogether and made a very important observation that the blood itself was sufficiently alkaline to render the quinine soluble in ether and that quinine could be recovered quantitatively from the laked blood without adding ammonia or other alkali.

This simplified the procedure and eliminated the sources of error considerably. The method adopted by us, which consisted essentially of that described by Vedder and Masen with some minor modifications, is given below.

The inner tube A of Vedder and Masen's extraction apparatus is packed vertically with narrow strips of



Whatman's filter paper, no. 1, neither too loose nor too tight, some smaller pieces being placed at the bottom. What led us to replace the asbestos fibres by filter

paper was that we found that the latter soaked the blood better than asbestos. With asbestos it was somewhat difficult to ensure uniform packing, and, if in any particular place the packing was too tight, the blood was held up there unabsorbed, resulting in incomplete extraction by ether. Two cubic centimetres of the blood accurately measured was slowly and more or less uniformly distributed amongst the vertically placed paper strips. Any blood that might escape absorption in the upper strips would get absorbed in the smaller pieces of filter paper at the bottom. The tube was then left for about 10 minutes to allow the blood to get completely soaked into the strips of filter paper. Then, with a clean platinum loop, the strips that had come together were detached and reshuffled so that ether might freely circulate and maximum surface be exposed to its solvent action. A small pledget of cotton was placed in the mouth of the tube, which was then inserted in the tube B. The construction of the tube B was similar to that used by Vedder and Masen, excepting that there were three small projections just above the constriction, somewhat like Buchner's tubes used for anaerobic cultures, to allow the ether to pass freely. Constructing the tubes in the manner described by the above authors we found that ether would often accumulate round the inner tube above the area where it had come in contact with the outer one and did not freely percolate to the bottom of the outer tube.

Ether was poured through the top of the tube A, so that after filling it up, it was allowed to overflow and fill nearly half of the bulb portion of the tube B. This was then connected to a reflux condenser through which cold water was allowed to circulate and was immersed in a warm water bath up to the level of the ether in tube B. After the extraction had been allowed to proceed for 2 hours, the inner tube was removed and the ether extract contained in the outer tube was put in a hot water bath to evaporate away the ether. It was then put inside a steam oven for a few minutes. Five cubic centimetres of $2N.H_2SO_4$ saturated with zinc sulphate were then added and the tube was immersed in a boiling brine bath for 3 minutes in order to bring the quinine into solution. The solution while still hot was filtered through a small Whatman filter. From the filtrate cooled down to the room temperature 3 cubic centimetres were then accurately measured into one of a set of small test tubes of uniform bore and constituted from same kind of colourless glass tubings, and to the others varying amounts of standard quinine solution in $2N.H_2SO_4$ saturated with $ZnSO_4$ were added. The standard quinine solution used contained 0.01 milligramme of quinine per 1 cubic centimetre of the solution. The total volume in each tube was then made up to 5 cubic centimetres by the addition of varying amounts of the acid zinc sulphate solution. The whole set of tubes was then brought to a uniform temperature by putting them in a beaker containing some tap water for a few minutes. 0.1 cubic centimetre of Roy's reagent was then added, mixed and the unknown compared with the standards against a white background.

Vedder and Masen recommend the use of potassium bismuth iodide reagent; but as it appeared to offer no advantage over the reagent recommended by Roy (1926) we used the latter. No gum arabic solution was added to stabilize the colour formed as it was found that even after 15 minutes the variation in the shades of colour were quite distinct without the addition of gum and could be easily read. We preferred to take readings with the naked eye instead of with the colorimeter as the former could be more readily taken and two or three unknowns could be compared against the same set of standards. Some of our readings obtained with the naked eye were also checked by means of the colorimeter. As we did most of our experiments on monkeys, we had to use 2 cubic centimetres and sometimes even smaller amounts of blood for our experiments.

To test the accuracy of this method, known amounts of quinine were added to monkey blood, well mixed and aliquot parts of this were treated in the manner described above.

The results were quite satisfactory as will be seen from the following table:

TABLE I

	Quinine added in milligrammes	Quinine recovered in milligrammes
1	0.020	0.020
2	0.020	0.018
3	0.015	0.015
4	0.015	0.018
5	0.010	0.008
6	0.010	0.010

Having satisfied ourselves with the accuracy of the method we proceeded to make our experiments on monkeys. The results are given in table II.

The monkeys were given the doses mentioned against each, of quinine acid hydrobromide dissolved in 2 cubic centimetres of distilled water.

We carried on our experiments mostly on monkeys, but in order to determine the concentration actually occurring in man, observations were also carried out on human patients in the Carmichael Hospital for Tropical Diseases. The results are given in table III.

With regard to the results obtained with the monkeys it appears that there is not any marked difference in the concentration of quinine attained in the blood at different intervals of time when the effect of its administration by the two routes, i.e., intravenous and intramuscular, is compared. In the former case the maximum concentration was found in the 15 minutes specimen which varied from 1.75 to 1.00 milligramme per 100 cubic centimetres of blood (average 1.37 milligramme per cent) as was to be expected. In the case of intramuscular injections also the average maximum was attained at almost the same time (variations between 1.7 to 1.05 milligramme per 100 cubic centimetres, average 1.37 milligramme per cent), although in individual cases there were deviations from this. After half an hour the concentration varied from 1.80 to 0.75 milligramme per 100 cubic centimetres (average 1.27 milligramme per cent) in the case of intravenous injections, while in the case of intramuscular injections it varied from 1.80 to 0.70 milligramme per 100 cubic centimetres (average 1.36 milligramme per cent). After two hours interval the intravenous results varied from 0.80 to 0.55 milligramme per 100 cubic centimetres (average 0.63 milligramme per cent), while with the intramuscular route the variations were from 1.3 to 0.4 milligramme per 100 cubic centimetres (average 0.83 milligramme per cent). After 5 hours, when the intravenous route was employed it was found that the

TABLE II
Experiments on monkeys

	Serial number	Weight of monkeys in kilograms	Dose in grammes	MILLIGRAMMES OF QUININE PER 100 CUBIC CENTIMETRES OF BLOOD AT DIFFERENT INTERVALS OF TIME AFTER ADMINISTRATION						
				15 minutes	$\frac{1}{2}$ hour	1 hour	2 hours	4 hours	5 hours	24 hours
Intravenous	1	6.10 (N)	0.10	..	1.50	0.75	..	0.50	..	..
	2	4.56 (I)	0.09	..	1.80	1.50	0.80	..	0.40	..
	3	3.80 (N)	0.09	..	0.75	0.75	0.60	..	0.25	..
	4	4.50 (I)	0.09	1.75	1.00	0.85	0.60	..	0.40	nil.
	5	3.78 (N)	0.09	1.00	0.85	0.80	0.55	..	0.40	nil.
	6	4.73 (N)	0.09	..	1.75	1.65	0.60	0.20	..	..
	AVERAGE ..		..	1.37	1.27	1.05	0.63	0.35	0.36	nil.
Intramuscular	1	3.76 (N)	0.09	..	1.80	1.90	0.90	..	0.60	..
	2	4.56 (I)	0.09	1.70	1.80	0.70	0.85	..	0.80	nil.
	3	3.16 (N)	0.09	1.05	0.70	0.60	0.40	..	0.25	nil.
	4	4.20 (N)	0.09	..	1.7	1.00	0.65	0.25	..	..
	5*	5.32 (I)	0.09	..	1.00	..	1.30	..	0.90	0.25
	5 (a)	5.32 (I)	0.09	..	1.20	..	..	..	..	..
	6†	5.19 (I)	0.09	..	..	1.01	0.90	1.00	..	0.45
	6 (a)	5.19 (I)	0.09	..	..	..	..	..	..	0.40
	6 (b)	5.19 (I)	0.09	..	..	..	..	..	..	0.20
	AVERAGE ..		..	1.37	1.36	1.04	0.83	0.62	0.64	0.32

* This monkey was given 0.09 gramme quinine acid hydrobromide again intramuscularly 24 hours after the first injection.

† This monkey was given two doses of 0.09 gramme quinine acid hydrobromide again intramuscularly at 24-hour intervals after the first injection.

N = Normal monkey.

I = Infected with malarial parasites.

TABLE III
Experiments on human beings

	Method of administration	Weight in kilograms	Dose in grammes	MILLIGRAMMES OF QUININE PER 100 CUBIC CENTIMETRES OF BLOOD AT DIFFERENT INTERVALS OF TIME AFTER ADMINISTRATION						
				15 minutes	$\frac{1}{2}$ hour	1 hour	2 hours	4 hours	5 hours	24 hours
1	Intravenous ..	63	0.50	..	0.80	0.50	0.25	..	..	nil.
	Intramuscular ..	63	0.50	1.0	..	..	0.65	..	0.30	nil.
	Per mouth ..	63	0.50	..	0.75	..	0.95	0.80	0.50	0.20
2	Intravenous ..	60	0.50	1.20	..	..	0.55	..	0.40	nil.
	Intramuscular ..	60	0.50	0.80	..	..	0.50	..	0.25	nil.
	Per mouth ..	60	0.50	0.15	..	..	0.55	..	0.20	nil.
3	Intravenous ..	65	0.50	0.62	..	..	0.40	..	0.20	nil.
	Intramuscular ..	65	0.50	..	0.50	..	0.80	..	0.30	nil.
	Per mouth ..	65	0.50	..	0.12	..	0.26	..	0.40	0.15
4	Intravenous ..	59	0.50	0.80	..	..	0.30	..	0.20	nil.
	Intramuscular ..	59	0.50	0.40	..	..	0.50	..	0.20	0.1
	Per mouth ..	59	0.50	0.10	..	..	0.30	..	0.20	nil.

N.B.—With human beings in the case of intramuscular and intravenous injections 5 and 20 cubic centimetres of distilled water were respectively used to dissolve 0.5 gramme of quinine acid hydrobromide.

quinine concentration had come down considerably (variations between 0.40 to 0.25 milligramme per 100 cubic centimetres, average 0.36 milligramme per cent) but in the case of the intramuscular route the concentration was maintained at a somewhat higher level (variations from 0.90 to 0.25 milligramme per 100 cubic centimetres, average 0.64 milligramme per cent). No appreciable amount of quinine was found in the blood after 24 hours of intravenous injections, but after intramuscular injections, some of the specimens drawn after 24 hours showed the presence of small but appreciable amounts of quinine.

A perusal of these results will show that quinine is retained in the blood for a somewhat longer time when given intramuscularly than when administered by the intravenous route. Unfortunately similar experiments with the oral route could not be performed with these animals, as monkeys will not swallow quinine even when carefully concealed in such food as bananas. If attempts are made to give it forcibly by the stomach tube they struggle, and generally get pneumonia and die. We therefore carried out a series of comparative experiments by all these routes in human beings.

Table III gives the results of such experiments. It will be observed that here also the same want of regularity which characterized the results with individual monkeys is apparent. For instance, in cases 1 and 3, the quinine concentration was found to be greater and maintained for a somewhat longer time in the case of intramuscular than with the intravenous route, but this does not apply to cases 2 and 4, where the concentration is nearly the same with both these routes except that attained after 15 minutes, which is definitely higher in the case of the intravenous method. Again with the same individual the results of intravenous injections of the same dose of quinine at different times (*vide* table III, case 1) do not run exactly parallel.

We also gave these individuals 0.5 gramme of quinine hydrobromide orally, with a view to see how the quinine concentrations in the blood at different intervals of time compared with those obtained by the two parenteral routes. In case 1 the results closely follow those obtained by the parenteral routes, but in cases 2, 3 and 4 the concentration obtained within the first few hours is definitely smaller. After that the concentration rises practically to the level of parenteral routes.

Taking these results as a whole, it appears that there is a good deal of individual variation as regards the concentration attained in the blood at different intervals of time, other initial conditions remaining almost the same, and even with the same individual when the same dose and route are employed the results of two

different experiments do not exactly run parallel. The concentration of quinine obtained in the case of monkeys, though on the average somewhat higher than with human beings, follow almost the same course.

Absorption after intramuscular injection

Our next object was to see if any appreciable amount of the quinine injected intramuscularly was left unabsorbed at the site of injection. The views expressed by the different workers on this subject are rather conflicting. Mariani for instance found that when quinine bihydrochloride (1 in 5) was injected into the leg muscle of a rabbit, 66.5 per cent of the injected quinine could be recovered from the site of injection 15 hours later. Dudgeon (1919) however could recover only traces of quinine from the muscle injected with concentrated solutions of quinine. Karamchandani (1933) repeated this experiment with a view to checking the results of the previous workers using Vedder and Masen's technique for blood with some modifications to suit the extraction of quinine from the minced muscles. He injected 0.5 gramme of quinine acid hydrobromide in a 1 in 3 solution into the gluteal muscle of a rabbit. After 17 hours the rabbit was killed and a portion of the injected muscle weighing 8.3 grammes was removed and the quinine content was estimated. This result shows that 80 per cent of the injected quinine was recovered from the muscles round the site of injection. We repeated this experiment using the technique used by Karamchandani but with much smaller amounts of quinine. We could see no justification for giving $7\frac{1}{2}$ grains or about 0.5 gramme of quinine hydrobromide, which is the dose for a human adult, to a rabbit weighing only about 2 kilogrammes. It would not be fair to draw any conclusions from experiments done under such abnormal conditions.

We therefore injected 0.02 gramme of quinine acid hydrobromide, which is the amount calculated on the basis of the body weight, dissolved in 1.0 cubic centimetre of distilled water into the gluteal muscle of a rabbit weighing 1.8 kilogramme. After 20 hours blood was withdrawn by heart puncture and the animal was killed. No quinine was found in the blood. A portion of the muscle from the injected area was then removed and another similar portion from the other leg was also cut off. These pieces of muscles were separately weighed, minced in a mortar with glass powder and then mixed with thinly cut pieces of filter paper and extracted with ether in a Vedder and Masen's apparatus for four hours. Quinine was estimated in the manner described above. This experiment was repeated with another rabbit weighing 2.0 kilogrammes with the results mentioned below :

TABLE IV

		Weight of muscle in grammes	Milligramme of quinine recovered	Percentage of the quinine injected
1. Rabbit, weight 1.8 kilogrammes	Muscle from the injected area.	3.5	0.05	0.32
	Muscle from the other leg.	4.7	nil.	..
2. Rabbit, weight 2.0 kilogrammes	Muscle from the injected area.	6.8	0.06	0.38

From the figures given in table IV we are justified in concluding that, in the case of intramuscular injections, only small proportions of the quinine injected remain unabsorbed at the site of injection after 20 hours, if administered in the usual clinical doses. The failure of absorption in the case of Karamchandani's experiments is due to severe injury caused to the tissue by the presence of large doses of quinine in the form of an acid solution.

Discussion.—The laborious experiments, the results of which are given in this paper, show that, if allowance is made for small variations due to the constantly changing factors in the animal organism, the concentration of quinine in the blood after administration by the oral and parenteral routes runs almost parallel. In some cases the concentration obtained within the first few hours after oral administration was definitely smaller, but the concentration soon rose to practically the level of the parenteral routes. It will be seen therefore that in ordinary cases no very great advantage can be claimed for any particular method. The routes selected by the clinician should therefore be what suits the patient best. It should be emphasized here that the clinical condition of the patient is the best guide in deciding what route should be adopted. The oral route is undoubtedly the method of choice in the vast majority of patients. The condition of the tongue is an excellent indication of the state of the gastric mucosa; in ordinary attacks of malarial fever the tongue is moist and slightly furred, and under these circumstances quinine is absorbed very well from the gut. If the tongue is dry, red and cracked, quinine is absorbed badly, and in such cases other means should be adopted. Quinine is generally absorbed readily from the gut; even in cases of severe malaria complicated with dysentery quinine has been shown to be absorbed. In those cases however, in which there is nausea and vomiting, or when the bilious vomiting of malignant tertian infection is present, it is useless to give quinine by the mouth. In such cases the parenteral routes should be adopted, the intravenous or the intramuscular route to be selected according to the requirements of the individual patient. As soon as the condition of the gastro-intestinal tract improves, administration by the parenteral

routes should be stopped and the drug given by the oral route. In view of the possible injury to the blood vessels, muscles, nerves, etc., by parenteral injections, this method should not be used for routine treatment of malaria, but is specially indicated in acute cases of severe type for as long as the emergency lasts.

Summary and conclusions

1. Quinine acid hydrobromide was given to two animals, particularly to two monkeys, and the concentration of quinine attained in the blood at different intervals of time in these animals and in four human cases was estimated.

2. The average maximum concentration was found in the blood after 15 minutes in both the cases; the average figures for blood drawn after half an hour and one hour respectively are about the same in both, and the concentrations in specimens of blood drawn after two hours and onwards show a gradual fall in both, though the intramuscular figures are somewhat higher than the intravenous ones.

3. In the case of intravenous injections no appreciable amount of quinine could be detected in the specimen drawn after 24 hours of the injection, but when the intramuscular route was used some of the 24-hour specimens showed the presence of small but appreciable amounts of quinine.

4. With human beings the figures obtained are similar to those obtained in the case of monkeys, though the concentrations obtained in the latter case are higher. The results of the oral administration of quinine are similar to those obtained with the parenteral methods, but the concentration reached within the first few hours by the oral method is sometimes much smaller.

5. There is a good deal of individual variation regarding the concentration attained at different intervals of time, and, even with the same individual when the same dose and route are employed, the results of two different experiments do not run exactly parallel.

6. The clinical condition of the patient is the best guide in deciding what method of administration should be adopted, in acute cases. The oral route is undoubtedly the method of

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QUININE IN THE THERAPEUTICS OF MALARIA

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To most of us with tropical experience, the symptoms and treatment of malaria, as described of late from temperate zones, have been most bewildering, and in fact we have felt that, were all that has been published to be confirmed, we must in the past have been most unobservant and allowed our patients to suffer very unnecessarily. Conclusions have been stated dogmatically and it has appeared to be thought that what applied in Camberwell must also apply in Cathay. The latest *Report of the Malaria Commission of the League of Nations* has, however, cleared the air considerably by the statement that 'the therapeutics of malaria, like every other aspect of the disease, is much more a local and individual problem than has hitherto been thought'.

(Continued from previous page)

choice in the large majority of patients, but parenteral routes should be adopted when this is not practicable. In view of the injury likely to result to the blood vessels, muscles, nerves, etc., by parenteral injections there is no justification for the routine use of this method in the treatment of malaria.

REFERENCES

- Acton, H. W., and King, H. (1921). *Biochem. Journ.*, Vol. XV, p. 53.
- Clark, A. J. (1934). *Applied Pharmacology*. J. and A. Churchill, London.
- Dudgeon, L. S. (1919). *Journ. Hyg.*, Vol. XVIII, p. 317.
- Fletcher, W. (1923). *Notes on the Treatment of Malaria with the Alkaloids of Cinchona*. (Studies from the Institute for Medical Research, Federated Malay States, No. 18). John Bale, Sons and Danielsson, Ltd., London.
- Gicmsa, G., and Schaumann, H. (1907). *Arch. Schiffs- u. Trop.-Hyg.*, Vol. XI, Beihefte, III, p. 113.
- Hatcher, R. A., and Gold, H. (1927). *Journ. Pharm. and Exper. Therap.*, Vol. XXX, p. 347.
- Karamchandani, P. W. (1933). *Records, Malaria Survey, India*, Vol. III, p. 445.
- Kelly, W. D. C. (1907). *Journ. Roy. Army Med. Corps*, Vol. IX, p. 67.
- Klicke, F. K. (1901). *Zeitschr. Hyg. u. Infektionskr.*, Vol. XXXVIII, p. 472.
- MacGilchrist, A. C. (1911). *Scientific Memoirs by Officers of the Medical and Sanitary Departments of the Government of India*, New Series, No. 41, p. 14, Supdt., Govt. Printing, India, Calcutta.
- Megaw, J. W. D. (1907). *Indian Med. Gaz.*, Vol. XLII, p. 10.
- Morgenroth, J. (1918). *Deut. Med. Woch.*, Vol. XLIV, pp. 961, 988.
- Ramsden, W., and Lipkin, I. J. (1918). *Ann. Trop. Med. and Parasit.*, Vol. XI, p. 443.
- Roy, A. C. (1926). *Indian Journ. Med. Res.*, Vol. XIV, p. 129.
- Scott, L. B. (1907). *Indian Med. Gaz.*, Vol. XLII, p. 114.
- Smith, F. A. (1911). *Ibid.*, Vol. XLVI, p. 333.
- Vedder, E. B., and Masen, J. M. (1931). *Amer. Journ. Trop. Med.*, Vol. XI, p. 217.

For many years it has been obvious, from the literature and the contradictory descriptions of the disease, that neither the human host nor the parasite are fixed quantities. There are probably many factors concerned, race, environment, present and past treatment, and heredity, which may affect the relations of the human host to the parasite, and the latter may consist of various strains, or it may be influenced by the insect species or the length of the period elapsing between transmission from host to host. These complications make the problem and generalizations on it difficult, and it has to be realized that findings under certain conditions or in certain climates may not be applicable elsewhere.

It is, therefore, not so extraordinary that opinion regarding the treatment and cure of malaria with quinine even after so long a trial is still unsettled. Some pin their faith to treatment by large doses, such as forty grains daily, others are satisfied with twenty, and it has even been stated that a grain or two for a couple of days is sufficient. Statements affirming a cure require to be accepted very cautiously, for in the first place there is no certainty as to how long periods of latency may be, or for how long after infection relapses may be possible, and in this matter also observations made in England quite possibly do not apply to the tropics. A change to the hills or a more temperate zone is a powerful adjuvant to the body winning in the fight against the parasite, so that results of experiments in more salubrious climes may not help with the management of the disease locally. Then, if the environment is not changed, the possibility of re-infections cannot be excluded, and these cannot be differentiated from relapses.

The standard course given

In an effort to effect a cure I have for many years prescribed a three months' course of quinine, ten grains daily, to suitable patients, including all my few European patients. Only the latter are here considered, as, on account of the precautions they take, they are not so liable to re-infections, and also they can be kept better under observation. Cases which have been free of fever for at least one year are counted as cures; it is not likely that in the enervating climate of Sylhet latent periods would exceed a year. Those getting fever with parasites within the year count as relapses, with the exception of a few cases where on the second occasion a different species of parasite was found. Patients who left the district before the elapse of one year are classed as unknown.

The average period between attacks is probably between two and three years, e.g., one patient had attacks in April 1928, September 1929 and October 1933, the first and last being benign and the intermediate attack malignant tertian; another patient had attacks of benign tertian in 1923, 1925 and 1932, each time in

June; and the writer has had three attacks in 1920, in 1923, and in 1931, the second one malignant tertian and the others benign, complete freedom being enjoyed in the intervening periods.

With these criteria the results of treatment in 110 cases have been :—

Cured	80
Relapsed	20
Results unknown	10

It is doubtful if there were any genuine relapses, as some were possibly re-infections and some patients certainly did not carry out the full treatment; a number confessed to not having done so, but unfortunately no note of this fact was made.

Courses limited to about six weeks appear to fail. The impression is that children require bigger proportionate doses, or possibly they are more exposed to re-infections.

Although the number of cases is small I feel that they have a definite value in that the patients were followed up in a way that is not usually possible in practice. Quite short courses have been reported as giving a big proportion of cures, but such are certainly not effective here. It may be that, if, instead of returning to work when their temperature has been normal for forty-eight hours, as patients do here, they rest for two or three weeks, they would do better on short treatments.

A few days quinine followed by three days atabrin appears to be useless as a cure, but two weeks quinine followed by nine days atabrin, three tablets daily, is promising and worthy of further trial.

In the treatment of the attack of fever twenty grains of quinine daily appear to be quite as efficacious as the larger doses, which only aggravate the discomfort of the patient. When quinine cannot be taken orally, intramuscular injections are effective, and these, given into the gluteus muscles, appear to have no untoward consequences. I used to give these injections very freely, but since I have used adrenalin to control vomiting they are hardly ever called for. The bilious remittent type of fever with its severe vomiting is unusual here, or they might be more often required. My assistants still continue to give a large number of injections and have an unshakable belief in them. They generally give them when the patient has had fever for about three days with quinine orally. The temperature comes down shortly after, as would be expected in any case, and doctor and patient are quite satisfied.

Only a few out of the many can be given a three months' treatment, and some even of the few will fail to stay the course, but the individual who can and does will, I believe, not be disappointed.

Discussion

The Malaria Commission say 'During the primary attack it may not be safe to abstain

for a day or two from giving a specific drug, but it is quite safe to do so in the first and any subsequent relapse'. This is a very sweeping statement, and, in my opinion, questionable. My own observation is that relapses may on occasion be more severe than the primary attack. A common history in a coolie child is two or three days fever treated with quinine; after ten days to three weeks the child has more fever, for which he is not brought for treatment, and he dies with convulsions on the second to the fourth day of the presumed relapse. Neither is the infection necessarily malignant tertian for that to occur. It is true that in the case of malignant tertian to some extent the Commission's advice is qualified, but the doctrine is an exceedingly dangerous one to preach to the laity, for blackwater fever most frequently occurs in just those patients who have been unadvisedly taking quinine on the lines recommended by the Commission. Moreover, a permitted relapse may take the cerebral form with disastrous consequences.

The ideal of the Commission appears to be Lagos and similar places, where nearly all the children and half the adults harbour parasites, and yet appear healthy. But has the toll taken in the process of acquiring this clinical immunity been considered, or that the scales are weighted against the patient in the case of intercurrent disease, accident, or maternity?

Not at least to attempt, as far as drugs and circumstances permit, a thorough treatment and cure would appear to be a policy of retrogression, more especially with the newer synthetic preparations at our command. The much-sought specific has yet to appear, but will probably be not long delayed. Recently an advertisement of a proprietary preparation announced the cure of numerous cases with one powder. Let us hope this flight of fancy will soon really materialize.

[*Note.*—The writer of the paper has just retired after many years of practice in Assam; during these years he has acquired a reputation as an astute clinical observer; we therefore welcome this summary of certain aspects of his clinical experience in the treatment of malaria. The figures he gives are not large, but, as he says, they make up in quality what they lack in quantity for he has had exceptional opportunities of following up his cases.

We note that he gives, as one of the reasons for the occurrence of relapses, failure to take the full course, some of his patients admitting their delinquency. His observation that 'courses limited to about six weeks appear to fail', seems to be dependent on the admissions of these delinquents, but is he certain that all of his 'successes' completed the full course of treatment? It seems possible that he did not question these patients nearly so closely.

Whilst we heartily agree with the writer that experience gained in Epsom is not necessarily applicable in Luskerpore, we must point out that, though he has shown that his three months' course will effect a reasonably good cure rate, he has produced no evidence to show that a shorter one would not have been equally effective.—Ebrton, I.M.G.]

THE EARLY TREATMENT OF MALARIA

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and

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ONE of the commonest problems facing the doctor in India is the case of acute malaria which he is called to see for the first time, and on his answer to the question 'What is the best immediate treatment?' may depend both the health of the patient and the reputation of the doctor, so it is in the hope of answering this question that this paper is written.

There is a lamentable tendency, particularly among the younger members of our profession, to trust laboratory reports more than clinical observation, and we cannot help feeling that in the matter of intramuscular quinine some of us have been rather led astray by conclusions based on laboratory experiments which are not confirmed by clinical experience. We have, for instance, been shown sections of rabbits' muscles containing clots and necrotic tissue after injections of quinine, but, so far as we are aware, human muscles have not been similarly displayed, and it has been our experience, over a large number of cases, that when proper precautions are taken no disability whatever, apart from occasional soreness, follows intramuscular injections of quinine.

Perhaps we have been fortunate, but in our cases, both in and apart from the present series, neither abscess nor tetanus has occurred, and we submit that these rarities should no more discourage the use of a very valuable procedure than they do ordinary surgical operations. All surgeons have seen a 'clean' hernia go septic after operation, and tetanus has been reported after appendicectomy, but there seems to be no diminution in the zeal of either patients or surgeons for the performance of these operations. One authority has even described intramuscular quinine as a 'criminal procedure', but we feel that he was arguing from insufficient data based on laboratory experiments, and was not giving clinical facts their full value.

We have recently been carrying out a series of experiments in treating a series* of 600 cases of 'parasite positive' benign malaria. Our

cases have been treated in the following ways:—

A. Quinine by the mouth (300 cases)

On admission, a blood smear is taken, and calomel, grs. 5, and sodium bicarbonate, grs. 10, given.

Four hours later, this is followed by half an ounce of magnesium sulphate in two ounces of water.

After the bowels have moved well, Sinton's mixture, quinine sulphate, grs. 10, citric acid, grs. 15, water to oz. 1, is given three times a day, with intermediate doses of twenty grains of sodium bicarbonate in water.

In studying a large number of temperature charts we have found a rather striking fact emerge, namely that if the temperature does not exceed 101.5°F. during the first 24 hours the above treatment is nearly always successful within 48 hours, i.e., the temperature falls to normal and remains there. If the temperature is higher, either it will take longer to come down or quinine injections have to be used. For some reason quotidian infections reacted much better than tertian.

B. Quinine by intramuscular injection (150 cases)

This was given in three classes of case:

- (i) Those which had not reacted to oral quinine after 48 hours.
- (ii) Those with high fever.
- (iii) Those with vomiting.

In the last class of case the quinine was generally mixed with a quarter of a grain of morphia, with the result that the vomiting and distress ceased within an hour, the patient went to sleep, and woke up feeling much better and often with a normal temperature.

It may, perhaps, seem unnecessary to give details of our technique in giving intramuscular quinine, but so convinced are we of the importance of asepsis that we venture to give the procedure in detail.

Sterilization of the syringe and quinine solution.—A 2 c.cm. 'Record' syringe is used, and is sterilized in its box, about two drachms of water being poured into the box, which is then closed, and, supported on a stand (a couple of cigarette tins do very well), boiled for five minutes over a spirit lamp. With the small amount of water mentioned boiling occurs after about a minute. When the syringe has been sterilized for five minutes the lamp is removed and the syringe, still in its closed box, allowed to cool while the quinine solution is prepared. A dessertspoon is now half filled with water (preferably distilled, but this is not essential) which is boiled over the lamp until it is reduced by about half, when 15 grains of quinine bihydrochloride, in powder or 'Tabloids', are added. The boiling is continued until the quinine has dissolved and the solution has become reduced to about 2 c.cm. (about a quarter of the dessertspoonful). The syringe is now removed from its box and the hot solution drawn up into it, the needle is fitted and the filled syringe laid aside while the patient is prepared. Where a number of patients are to be injected a larger syringe is, of course, used, with a fresh needle for each.

* [Note.—It is not clear what the writers mean by a series of 600 cases; it seems improbable that exactly half required parenteral injections and that 25 per cent of a series of benign tertian infections were cases of cerebral malaria. If the numbers had not been mentioned, the paper would have appeared as a general summary of experience—the interpolation of the numbers might lead to erroneous deductions. For this reason we hesitated to publish this note for some time; we do so now as the subject seems to us to be due for discussion.—Editor, I.M.G.]

Preparation of the patient.—The patient is turned on his face or side and the upper and outer quadrant of one buttock scrubbed with an iodine swab. In women or shy people the deltoid may be used, but the buttock is better.

Injection of the quinine.—By the time the iodine on the skin is dry the syringe is generally comfortably warm. If it is hot one must wait for a minute or two until it feels about blood-heat. If it is too cold the quinine solution is apt to be too thick to go through the needle. The patient is now told to relax his muscles (one of us, from personal experience, can testify to the importance of this) and the needle of the syringe quickly thrust vertically into the gluteal muscle, the solution is injected, and the needle withdrawn. It is an advantage to have a minute bubble of air at the needle end of the syringe before injection, as this ensures that none of the solution enters the subcutaneous fat. After the injection the site is massaged for about a quarter of a minute.

Results.—As already mentioned, no untoward results have followed this treatment in our hands, either in the present or in other series of cases. Sometimes a certain amount of soreness has followed the injection, but this has never been severe or of more than a few days' duration, and it has never been so severe as that commonly felt after an anti-typhoid inoculation.

Therapeutically, the effect has almost invariably been that within 24 hours after the second, and often after the first injection, the temperature has come down to normal and remained there, after which quinine by the mouth has been given. The average number of intramuscular injections was two, and it was rarely necessary to give more than four, in fact one might say that if four daily injections of quinine do not control the fever, that fever is not due to malaria. We should like, therefore, to emphasize here that we do not advocate prolonged treatment of malaria by quinine injections, either intramuscular or intravenous, as once the temperature has remained normal for 48 hours, quinine by the mouth is quite capable of keeping it there. One great advantage of injected quinine is that the attendant knows that the patient is getting 'what the doctor ordered', and another is that it is rarely followed by tinnitus, nausea or vertigo. In chronic or 'quinine-resistant' cases it is a great advantage to add one grain of sodium cacodylate.

Children.—Children are given proportionate doses, and it is in them, especially those unable or unwilling to swallow quinine, that intramuscular quinine perhaps has its happiest results. When a child is feverish it is cross and 'negativistic', but when the temperature is normal again the child becomes more rational, and will usually swallow quinine, atabrin or plasmoguin.

C. Intravenous quinine (150 cases)

In cases of cerebral malaria it has been our experience that this is undoubtedly the method of choice.

In the present series we have used three different methods, but in all cases the vehicle

has been the same, namely 5 c.cm. of normal saline. The methods have been

- (i) Quinine bishydrochloride, grs. 5 (or in severe cases grs. 10).
- (ii) Ditto with 0.5 c.cm. pituitrin.
- (iii) Ditto with 1 c.cm. adrenalin solution.

The immediate therapeutic effect of intravenous quinine has been similar to that of intramuscular, but perhaps prompter and perhaps more transient, but very definite. It has, however, been marred by the occurrence of a 'reaction'. This reaction occurred in about thirty per cent of our cases, was most common and severe with quinine and pituitrin, less so with quinine alone, and least so with quinine and adrenalin, but was quite definite and troublesome enough even in this last method. It varied in severity from a passing rigor to severe vomiting, diarrhoea and collapse, which on occasion demanded vigorous treatment in the form of brandy and intravenous saline. In some cases the reaction occurred immediately, when it generally took the form of vomiting, and in others up to three hours after the injection. In one case, where the reaction came on three hours after an intravenous injection of quinine and pituitrin, the patient collapsed and died. In another, the patient developed severe purging and collapse two hours after an intravenous injection of quinine and adrenalin, but was revived by a hypertonic intravenous saline, and was quite well the next day. It seems fair to assume that these reactions are due to the method and not to the drug, as they were observed only after intravenous, and never after oral or intramuscular quinine.

It is the occurrence of these reactions which to our minds is the greatest drawback of the intravenous method. All our intravenous injections were given very slowly, about five minutes being taken over each, and all were given in five c.cm. of normal saline. A well-known Quetta practitioner put the case very well when he remarked, 'If I give intravenous quinine I often find another doctor in attendance next time I go to see the patient'. Another drawback is that for those not skilled in intravenous injections it is more difficult than intramuscular quinine, and more likely to be followed by an abscess. Even the expert finds it difficult in a patient with small veins or in a dark room.

Conclusions

(i) Quinine by the mouth controls cases of benign malaria without high fever, and is the method of choice in such cases, for early treatment.

(ii) The dangers of intramuscular quinine have been exaggerated, and it is the best treatment for severe cases of benign malaria, including those which have not reacted successfully to quinine by the mouth.

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INTRAVENOUS QUININE THERAPY IN MALARIA

By S. SUBRAHMANYAM, L.M.P.

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In the treatment of malaria, intravenous quinine has been employed only very sparingly hitherto owing to the alleged risks attending it. However, since April 1932, in the treatment of about 300 cases of malaria of all types, this has been the method almost invariably employed in this hospital, and the following is the routine adopted throughout:—

Technique and dosage.—A stock sterilized solution of the acid hydrochloride in distilled water in the strength of a grain to each cubic centimetre is prepared and kept ready for use in a stoppered bottle, and is re-sterilized in a water bath twice a week. The adult dose that has been employed is 10 cubic centimetres of the solution, the injection being given once a day for six consecutive days. In every case the blood pressure is recorded both before and after the administration of the drug. The injection is given very slowly with the usual aseptic precautions into one of the veins at the bend of the elbow, and during the process of injection a careful watch is kept on the pulse, blood pressure and respiration. In cases of patients with low blood pressure—that is 100 mm. Hg. systolic—three to five drops of adrenalin solution 1 in 1,000 are added to the quinine prior to the injection. In those rare instances where during the administration of the injection, the blood pressure begins to fall considerably or there is respiratory embarrassment, the injection is stopped and no further attempt is made to give quinine intravenously.

The blood pressure variations before and after the injection.—The blood pressure variations have not been quite constant. There has generally been in the majority of cases treated a drop in the blood pressure, both systolic and diastolic, to an extent of 5 to 15 mm. Hg., rarely 20 to 30 mm.; occasionally the diastolic reading has remained more-or-less constant or has even risen higher. Very rarely—it was observed only once in the present series—both the systolic and diastolic pressures show an increase after the injection. Usually the blood pressure reading returns to its original level in about 10 to 15 minutes time.

Effects of the injection on the parasite.—Usually within 24 hours after the first injection,

the parasites have disappeared from the peripheral blood; in rare instances, however, the blood films have revealed their presence up to 48 hours after the first injection though in decreased numbers.

Complications

(1) Almost every patient has complained of some giddiness and slight burning sensation in the abdomen during the injection. These sensations are purely transient and need no special treatment.

(2) In a few instances, the blood pressure has dropped considerably. A hypodermic injection of 0.5 c.cm. of adrenalin solution, 1 in 1,000, is usually all that is necessary to restore the blood pressure to its normal.

(3) Cyanosis and respiratory embarrassment have not been observed in our series, but when they occur an injection of strychnine, 1/60 grain, supplemented by oxygen inhalations should be given.

(4) In one or two instances, phlebitis of a moderate degree has occurred; but this responded rapidly to treatment with two injections intramuscularly on successive days of 1 c.cm. of S. U. P. 36.

Contra-indications.—Excepting in the cases of very young children without good veins, and extremely debilitated persons, there does not seem to be any absolute contra-indication to the use of the drug intravenously. There were no bad effects in the case of a woman who was three months pregnant and who had the full course of the injections.

Results

Our experience shows that, provided the correct technique is followed, the risks are negligible. Every patient who had the full course was requested to report if there were any relapses, but so far only one patient has come forward; this patient was originally treated for malignant tertian infection and came back to the hospital after a few months with a blood picture showing benign tertian parasites.

The advantages of this method are:—

1. It cuts short the duration of the primary attack, the temperature ordinarily keeping down to normal after the first two injections.
2. The course of treatment does not extend beyond six days.
3. It is at once cheap and effective.

Out of the series treated the gross mortality was about 1.5 per cent, death occurring in three cases with cerebral malaria and in two with a malignant infection and severe toxæmia; these patients came under treatment too late.

My thanks are due to Lieutenant-Colonel A. S. Leslie, I.M.S., superintendent of this hospital, to whom I am very much indebted for his valuable advice and kindness in permitting me to make use of the hospital records.

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(iii) Not more than four doses of intramuscular quinine need be given.

(iv) Intravenous quinine is the method of choice in cerebral malaria, but its dangers should be realized, it should not be used in other cases unless the patient can be watched for several hours after the injection, and even then intramuscular quinine is safer.

NOTES ON INTRAVENOUS VERSUS INTRAMUSCULAR QUININE

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My earliest experiences of quinine by injection were in the Army in 1916. At that time, as far as my memory goes, quinine by the intramuscular route was not only regarded as bad practice, but was absolutely taboo, at least in the division in which I served.

I can still remember the trepidation with which I administered quinine intramuscularly in 1917; I hoped that the brand of Cain, which I was certain must have glowed on my forehead, was not too visible to those who saw these performances. I lived in fear of tetanus and abscess for days after each such case; my fear was never justified.

I have never abandoned the intravenous route, but I have used the intramuscular with ever-increasing confidence, a confidence which I have never found misplaced.

Most of my experience of quinine by injection came subsequently to 1920 when I took up tea-garden practice. My reasons for its adoption were several: firstly, there is less actual preparation in giving the injection and this appeals to the coolie. The puncture is made rapidly and the injection is all over in a minute or two. With intravenous quinine, more time is expended. It is often necessary in tea-garden practice to have an assistant to hold the arm and the time of injection is much longer depending on the dilution of the solution used which should never be less than 10 c.cms. The coolie enjoys the quicker route, and the absence of fuss and assistants makes for confidence. This is a very essential point in dealing with ignorant labourers.

Site.—I usually prefer the buttock in children as it is easiest to inject. In working adults also, I generally prefer the buttock, because, if there is any residual tenderness, the patient is not rendered unfit for his manual occupation.

In cases where there are no special indications, I prefer the deltoid site as absorption is quicker there on account of a better blood supply.

Indications.—I use intramuscular quinine in all cases of malaria with obstinate vomiting, hyperpyrexia and intense headache. In algid cases with heavy malignant tertian infections and in cerebral cases, I still prefer the intravenous route. Even in these cases, I am now in doubt about the advantages of intravenous quinine. I have seen collapse following intravenous injection in cerebral cases when quinine was given in doses of $7\frac{1}{2}$ grains in 20 c.cms. of normal saline plus adrenalin chloride (1 in 1,000) 5 to 10 minims. I am not certain that a larger intramuscular dose, even in cerebral cases, is not the better practice.

The main drawback to the intravenous route is shock following injection. However competently the injection is carried out, this does occur and in cases already in the stage of collapse, the onset of shock is very sudden and little can be done to check the inevitable sequel. In using intravenous quinine, I always give the quinine (bihydrochloride or bihydrobromate) in doses of 5 to 10 grains in 20 c.cms. and always with adrenalin chloride (1 in 1,000) in doses of 5 to 10 minims.

The sole advantages of intravenous quinine are the greater rapidity of action and the entire absence of local pain. Against those are to be put the risk of collapse, extreme sweating and, in some cases, complaint of dryness of the throat. In coolie practice also, the appearance of a drop of blood in the syringe, following the puncture of the vein, is often a cause of alarm to the patient.

The disadvantages of intramuscular quinine are that there is in 30 per cent of cases some residual tenderness. I have never seen tetanus follow injection. Abscess I have seen in a few cases in the last 15 years where assistants have been hasty or careless in administration. Given proper sterilization of the syringe, a decent needle, not rusty, and the sterilization of the site of injection with tincture of iodine, abscess occurs only in very few instances, if ever.

Generally the fault lies in the desire of the assistant to get the injection over and done with and he does not allow the tincture of iodine to remain long enough on the skin to ensure sterilization. I insist on a minimum of four minutes for this process.

The effects of intramuscular quinine are shown in a somewhat slower action, and are specially useful as excretion of quinine takes longer than in intravenous therapy. After-pain, in intramuscular injection, can usually be completely aborted by fomentations for a few hours.

In some parts of Assam there is a practice of using intramuscular quinine with adrenalin. I do not advocate this as it is evident that adrenalin must decrease the rate of absorption, and probably tends to induce after-pain. It is also evident that, if fomentation removes after-pain by inducing a local congestion, adrenalin must be, not advantageous, but actually deleterious.

I issued a questionnaire to my assistant medical officers and the result was that, out of fifteen, fourteen were in favour of the intramuscular route, in all cases when injection was called for except in extreme cerebral or algid cases. All used quinine bihydrochloride in doses of 5 to 10 grains and in dilutions of $1\frac{1}{2}$ to 3 c.cms., the majority favouring 10 grains in 2 c.cms. for adults.

For intravenous use, the usual dose was 5 to $7\frac{1}{2}$ to 10 grains in 20 c.cms. of normal saline plus, in all cases, adrenalin chloride (1 in 1,000)

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SOME OBSERVATIONS ON THE COMBINED METHOD OF CLOT CULTURE AND WIDAL REACTION, AND ON THE PROGNOSTIC SIGNIFICANCE OF 'SMALL-FLAKING' OR 'O'-AGGLUTININS IN TYPHOID FEVER*

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It is now generally recognized that the diagnosis of enteric infection by the agglutination test requires a degree of precision, the need for which has become more apparent only within recent years. It was strongly emphasized in a previous communication (Soman, 1932) that in order to minimize the chances of errors in the diagnosis by methods of agglutination alone, a clot culture should be made from the same sample of blood. The number of cases studied, and reported in this first paper being by no means large, it was decided to give a further trial to the method on the same lines, and to collect a larger series.

Thus the first part of this article deals with the method above mentioned and records the examination of 400 samples, sent for Widal reaction and clot culture during the last two years. The samples of blood were chiefly received from the J. J. and the allied group of

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5 to 10 minims. All these men have had very considerable experience of both types of injection. I must make it clear that the technique does not influence their decisions because all use the intravenous route many times monthly in the treatment of other diseases, such as severe diarrhoeas and bacillary dysenteries, venereal diseases, anæmias, etc. Experience is the only factor and the general experience agrees with mine. In helping them to make their choice, I have never attempted to be dogmatic and have always allowed free scope to each man's clinical experience. Several reported early collapse in cerebral cases following injection and, whilst keeping an open mind, I am not certain that intravenous quinine may not have proved, in some cases, the last straw. On that point, I still have residual doubts.

I have personal experience of quinine by both routes and I now always ask for intramuscular. That queer catch in the throat and the feeling of faintness after intravenous quinine are really unpleasant. Personally I have never had pain or tenderness after properly-given intramuscular quinine.

I should not like to express my opinions as final or as representative of general opinion, but only as the personal result of a clinical experience of quinine extending over 17 years.

hospitals in Bombay. It is unnecessary to recapitulate all the advantages claimed for this method, since the results obtained from a larger series of cases confirm all the previous findings and the claims that were made.

The second part of this paper deals with 'O'-agglutinins and the actual technique employed in demonstrating them. A series of 150 samples of blood were tested by agglutination methods, with a special reference to the presence of O-agglutinins. Out of 150 samples only 50 of them turned out to be positive for typhoid infection, the rest being negative both by agglutination and culture test.

Clot culture and Widal

Of the 400 specimens examined, 288 were negative, both serologically and culturally, and 112 gave positive findings, 93—typhoid, and 19—paratyphoid A; in no case was paratyphoid B diagnosed.

The actual findings in these 112 specimens are shown below :

		Typhoid.	Para. A
Widal	+	27	1
Clot culture	+		
Widal	—	14	1
Clot culture	+		
Widal	+	52	17
Clot culture	—		

Note.—Widal tests were done by Dreyer's method and with formalized broth suspensions from the Standards Laboratory, School of Pathology, Oxford, and the test was taken as positive in the case of typhoid in a serum dilution of 1 in 50 or higher, and 1 in 25 or higher in the case of paratyphoid A infection. Clot cultures were done according to the technique previously described (Soman, 1932).

From the series tabulated above, the following facts emerge :

1. In Bombay *B. typhosus* plays a predominant rôle, compared with other enteric-group organisms, in causing enteric fevers. Paratyphoid B infection was not demonstrated and is thus apparently rare.

2. The clot cultures, although done at different periods during the course of disease, were positive in 45 per cent of typhoid infections, while the diagnostic H-agglutinins are always fluctuating and were absent in one-third of these culturally-diagnosed cases.

3. Clot culture is of special value in the case of children in which the late appearances of H-agglutinins in the blood is a noticeable feature necessitating repeated examination.

The large number of entirely negative findings may seem to call for an explanation. It is not possible to conclude that these were all non-enteric cases, as the specimens were not subjected to agglutination tests for paratyphoid C nor for the other *Salmonella* group of infections. Admittedly, the routine clot cultures gave negative results, but paratyphoid C or the

Salmonella organism rarely invade the blood stream, and, if they do, the bacteremia that follows is of the most transient character. The same is true of paratyphoids A and B organisms, the difference among them being only of one degree. The large number of negative clot cultures, 17 out of 19 cases for paratyphoid A infection, supports the above statement. Further, a number of so-called continued fevers are nothing but malignant tertian malarial infections.

O-agglutinins

It is now recognized that different components of the bacterial cell may give rise to separate and distinct agglutinins. As early as 1903, Smith and Reagh, from observations on motile and non-motile strains of the hog cholera bacillus, concluded that the somatic and flagellar constituents of a bacterium produced two corresponding agglutinins. This work has been much extended by Weil and Felix. They designated the two agglutinins as 'H' and 'O'. A motile bacterium, the 'H' variant, produces both 'H-' and 'O-' agglutinins, while the non-motile or 'O' variant produces only 'O'-agglutinins. These O-agglutinins are also variously described as somatic agglutinins, or small-flaking or granular agglutinins. The flagellar, or large-flaking agglutinins, resist a temperature of 70°C. for twenty minutes while the somatic agglutinins are damaged, though not quite destroyed, by this temperature. In a recent paper (Felix and Olitzki, 1928), it has been proved that, for *B. typhosus* and the Salmonella group, phenol and formaldehyde, in the concentrations usually employed in preserved bacterial suspensions, produce a transient or permanent inhibition of the O-agglutinins, while H-agglutinins remain unaffected. Hence it has become absolutely imperative to use separate alcoholic 'O' suspensions which are prepared from the most sensitive non-motile 'O' variant of *B. typhosus*. In the O-agglutination test the clumps are slowly formed and are small and dense, whereas in H-agglutination, or the customary Widal, the clumps appear more rapidly and are large, loose, and fluffy. O-agglutination is however a group reaction, common to typhoid, paratyphoids A and B and Gaertner infection, and for further differentiation within that group one may have to wait for the appearance of the H-agglutinins, which are specific.* Much depends

on the extreme sensitiveness of the strains of 'O' variants of *B. typhosus*.

A passing reference to this type of agglutinin and the part it plays in the course of typhoid infection has already been made in a previous paper, and since then it has been possible to put my suggestions into practice in a large number of cases and to verify them. It was suggested that during the course of typhoid infection some correlation exists between the presence of O-agglutinins in the serum and the presence of infective organisms circulating in the blood stream at the same time, which influences the prognosis of the case to a great extent. The present study of fifty cases of typhoid fever confirms the original suggestion and the findings, as will be immediately seen from reference to tables A and B.

While I was going through the literature on the subject of O-agglutinins I was investigating two cases of enterica, both in the second week of the disease. Clot cultures from both cases were positive for *B. typhosus*; the H-Widal was positive in both the cases in a serum dilution of 1 in 250; one of the patients died of toxæmia and the other one made an uneventful recovery. The suggestions of Felix regarding the prognostic value of the O-agglutination test encouraged me to test the serum of both these patients—which I had kept—for the presence of O-agglutinins; the tests demonstrated a complete absence of this type of agglutinin in the serum of the one that died, and its presence up to a dilution of 1 in 250 in that of the one that survived. It is interesting to note that the end titre of H, or large-flaking, agglutinins was also determined and was found to be almost 1 in 5,000 in both the cases.

This was the starting point of the investigation reported below. Since then, I have been able to verify this observation and by correlating my findings I am usually able to make a correct guess as to the chances of life of the patient, as far as possible independent of any clinical prognosis.

The following is the actual technique employed in performing the O-agglutination test:

A sample of blood five to ten cubic centimetres is received from the hospital in a sterile test-tube. The clear serum is tested in the usual way by the customary Widal for typhoid, and paratyphoids A and B, and a part of the serum is stocked aseptically for further use. The remaining clot is then cultured in a medium of sterile ox-bile. For the O-agglutination test, Dreyer's method of setting up the test, with only first series of dilutions, was used throughout (macroscopic). The titres were calculated from the readings obtained after four and a half hours incubation in the water bath at 53 to 55°C. and a further period of sixteen to twenty hours at room temperature. The last tube showing a definite trace of clumping was taken

*[Note.—The 'O' antigens of typhoid and enteritidis are similar but the 'O' antigens of both paratyphoid A and paratyphoid B are antigenically different from typhoid and from each other. The presence of O-agglutinins, therefore, is diagnostic in all cases except where there is suspicion of enteritidis infection; in these cases one has to wait for the appearance of H-agglutinins.

The author throughout used the term *OH*-agglutinins, instead of the more usual *H*-agglutinins. Further, he wrongly attributes this term to Felix (1929) in his quotation from that writer; we have corrected this quotation and in order not to confuse readers have used the now generally accepted term 'H-agglutinins'.—EDITOR, J.M.G.]

as the end point. Use of hand lens was made wherever required. Standard alcoholic suspensions, from the Standard Laboratory, Oxford, were used.

Thus, from one sample of blood three findings were noted each time, H-Widal, O-Widal, and the result of clot culture. Along with these triple findings, important details as regards the clinical history of the case were recorded. In every case thus observed, the previous history regarding inoculation with T. A. B. vaccine or any attack of typhoid fever within the last couple of years, or treatment with injections of 'sero-bacterin' (Mulfords) was ascertained with the utmost care.

When a series recorded in this fashion accumulated to fifty cases, of which the majority are controlled by positive clot cultures, it became possible to draw certain inferences which, in my opinion, fully substantiate the suggestions of Felix as regards the value of sero-prognosis. A critical analysis of tables A and B not only gives an indication of the value of O-agglutination in sero-prognosis and sero-diagnosis, but supplies valuable data regarding the appearance, period of maintenance and the disappearance from the serum of O-agglutinins.

Discussion on the tables

Fifty cases of typhoid fever are divided into two groups according as the case ended fatally or recovered. Table A shows twelve cases that ended fatally and table B thirty-eight cases of recovery. Fatal termination is the only criterion of severity here considered, although some of those that recovered were clinically of a severe type with a grave prognosis.

Table A.—The H-Widal, the O-Widal and clot culture were all done with the same sample of blood each time.

Firstly, it will be noted that O-agglutinins were absent in the first nine of twelve fatal cases; secondly, they were absent at a time when infective organisms were circulating in the blood; thirdly, the days of fever on which these findings were noted were very variable, extending from the eighth day to the twenty-eighth day of fever; fourthly, every patient died within two to three days of the last laboratory examination; and lastly, the titre of the H-agglutinins is a matter of no importance as regards the prognosis. This last is an important point in view of the old erroneous theory regarding the prognostic value of a rising H titre.

It is particularly interesting to study the clinical features of the last three cases from the table; O-agglutinins were definitely present in a serum dilution 1 in 250 (end titres not done). Whereas one would predict good chances of recovery under these conditions, death actually ensued.

It seems probable that even O-agglutinins are powerless in the presence of heavy secondary infections, such as those of pneumococci and

streptococci that were noted respectively in the first two of these cases.

Further it is possible that the critical point in the titre which determines death or recovery is higher than 1 in 250, which was the highest point to which the titre in any of these O-agglutination tests was carried.

Table B.—This records 38 cases of typhoid fever, the majority being controlled by positive clot culture, that recovered and were discharged from the hospital as cured. A few of these cases, namely, nos. 2, 3, 11, 18, 20 and 21, did not run a very smooth course during their illness, unlike the majority who made uneventful recoveries. Out of 38 cases clot cultures were positive in 22, while the rest were diagnosed clinically and serologically. Unlike the table of deaths, the table of recoveries demonstrates the presence of O-agglutinins at some stage of the infection, although the day on which they appear seems to be variable.

Usually the patient is admitted to hospital after six or more days of continued pyrexia at home, so that the earliest observation in this table is on the sixth day of fever, and the majority have been tested from the eighth day onwards. The last examination was usually done on the day the patient left hospital.

In connection with the tables, the following questions arise:—What is the earliest periods during typhoid infection at which O- and H-agglutinins, respectively, appear? Do both appear simultaneously, or one after the other? When O-agglutinins are once formed, are they liable to fluctuations or complete disappearance in the early part of the infection? What is the limit of their late appearance in the patient's serum, (a) when he is going to recover, and (b) when he is going to die? What is the earliest period at which they cease to be demonstrated in the convalescent patient's serum? And, lastly, what may be the longest period at which they can be demonstrated in the patient's serum during convalescence or after cure?

It may not be possible here to answer all these questions but certain generalizations can be made which do not seem to be in keeping with those of other observers.

O-agglutinins were absent in the four cases (table B) in which the first test was done on the sixth or seventh day, but of those done on the sixth or seventh day, but of those done in the second week, they were present in nine out of fifteen cases of table B and in only one out of six in table A. H-agglutinins were present in one of the cases tested on the seventh day, and in all but two of the fifteen tested during the second week.

In one case O-agglutinins were absent as late as the eighteenth day, but they appeared three days later and the patient's condition improved coincidentally.

In one case of table B the O-agglutinins had disappeared by the twenty-second day and in another on the twenty-eighth, but in five out of

six cases that were tested in the fifth, sixth and seventh weeks they were still present.

There are no consistent records by other observers regarding these particular points, but in the opinion of Felix and Olitzki (1928) both agglutinins are formed in the majority of typhoid cases though there may be great variations in the time of their appearance during the course of the disease. It is pointed out in the Medical Research Council's *A System of Bacteriology* (Vol. VI) that, compared with the H-agglutinins, the somatic or O-agglutinins seldom reach so high a titre during infection, usually disappear more rapidly after recovery, and are not known to be capable of resuscitation by non-specific stimuli.

O-agglutinins in sero-diagnosis

The diagnostic significance of the O-Widal is unchallenged and it is usually considered worth while performing this test as a diagnostic measure, but in this particular series, in which all were controlled by the H-agglutination test and 36 out of 50 by cultural methods, no single case of typhoid gave a positive O-agglutination test in the absence of H-agglutination. This is contrary to the experience of workers in Palestine (Felix, 1929) and South Africa (Pijper, 1930), and Gardner (1929) suggests that O-agglutinins are relatively more common in the typhoid encountered in the latter country than in Europe.

The quantity of O-agglutinins formed may be a variable factor, depending on season, country, or infective agent. In all the cases in this series, either the H-agglutination test is definitely diagnostic, or, in its absence, the culture

for *B. typhosus* is positive. Hence it appears that with the method of clot culture and the H-Widal test, there is little opportunity of missing the diagnosis of typhoid fever. Still it is advisable to follow Gardner's suggestions, who recommends that 'if inoculation be particularly excluded the estimation of O-agglutinins is only called for when the customary H-Widal is negative or doubtful'.

O-agglutinins in sero-prognosis.

The importance of the somatic agglutinins or O-agglutinins in the sero-prognosis has been stressed by Felix (1929), who observes, 'when the possibility of sero-prognosis in typhoid fever was recognized as being based on the regular and the close relationship between O-agglutination and the severity of the disease, but, independent of H-agglutination, the chief attention was directed to the O- rather than to the H-agglutination'. They are absent in the most severe cases and in a certain proportion of the slightest cases. Table A demonstrates clearly the truth of this statement. Stuart and Krikorian (1928) also record similar cases and observe that in view of the important rôle assigned by certain workers to the small-flaking or O-agglutinins in the production of immunity, it is of interest to record that such cases terminated fatally. The old method of sero-prognosis, by demonstrating the gradual rise in the H titre till it reaches a certain maximum, holds good no longer, as these agglutinins fluctuate over a wide range independently of the clinical course of the disease.

TABLE A

Deaths

Serial number	Day of fever	H-Widal	O-Widal	Clot culture	Day of death	Cause of death
1	8th	1 in 250	Negative	<i>B. typhosus</i>	12th	Toxæmia.
2	12th	Negative	Negative	<i>B. typhosus</i>	16th	Hæmorrhage.
3	12th	Negative	Negative	<i>B. typhosus</i>	..	Hæmorrhage.
4	22nd	Negative	Negative	<i>B. typhosus</i>	30th	Toxæmia.
	28th	Negative	Negative	Not done		
5	17th	1 in 250	Negative	<i>B. typhosus</i>	22nd	Toxæmia.
6	?	1 in 250	Negative	<i>B. typhosus</i>	Next day	..
7	11th	Negative	Negative	<i>B. typhosus</i>	16th	Toxæmia.
	16th	1 in 250	Negative	Not done		
8	12th	1 in 125	Negative	<i>B. typhosus</i>	..	Hæmorrhage.
	15th	1 in 125	Negative	Not done		
	18th	1 in 125	Negative	Not done		
9	16th	1 in 125	Negative	<i>B. typhosus</i>	20th	Hyperpyrexia.
	18th	1 in 125	Negative	Not done		
	19th	1 in 125	Negative	Not done		
10	18th	1 in 250	1 in 250	<i>B. typhosus</i>	..	Pneumonia.
11	26th	1 in 250	1 in 250	<i>B. typhosus</i>	..	Hæmorrhage.
12	12th	Negative	1 in 250	Sterile	27th	Toxæmia.
	24th	1 in 250	Negative	<i>B. typhosus</i>		

Note.—No. 8 developed severe diarrhœa on the 16th day. No. 11 also had streptococcal pneumonia.

TABLE B
Recoveries

Serial number	Day of fever	H-Widal	O-Widal	Clot culture
1	10th	1 in 250	1 in 125	<i>B. typhosus.</i>
	16th	1 in 250	1 in 250	<i>B. typhosus.</i>
	22nd	1 in 250	Negative	Not done.
	30th	1 in 125	Negative	Not done.
	39th	1 in 50	Negative	Not done.
2	8th	1 in 250	Negative	<i>B. typhosus.</i>
	13th	1 in 125	Negative	Not done.
	19th	1 in 125	1 in 125	Not done.
	32nd	1 in 125	1 in 50	Not done.
3	18th	1 in 250	Negative	<i>B. typhosus.</i>
	21st	1 in 250	1 in 125	Not done.
	27th	1 in 250	1 in 250	Not done.
	37th	1 in 250	1 in 50	Not done.
4	11th	1 in 125	1 in 125	<i>B. typhosus.</i>
	17th	1 in 125	1 in 125	Not done.
	22nd	1 in 125	1 in 125	Sterile.
	28th	1 in 250	1 in 125	Not done.
	34th	1 in 250	1 in 125	Not done.
	43rd	1 in 125	1 in 50	Not done.
5	13th	1 in 250	1 in 250	Not done.
	16th	1 in 250	1 in 250	Sterile.
	20th	1 in 250	1 in 250	Not done.
	25th	1 in 250	1 in 250	Not done.
	40th	1 in 250	1 in 250	Not done.
6	21st	1 in 250	1 in 250	Not done.
	24th	1 in 250	1 in 250	Not done.
	37th	1 in 250	1 in 250	Not done.
7	12th	1 in 25	1 in 250	<i>B. typhosus.</i>
	18th	1 in 25	1 in 250	Not done.
	26th	1 in 50	1 in 250	Not done.
8	10th	Negative	Not done	Not done.
	17th	Negative	1 in 250	Contam.
	23rd	1 in 250	1 in 250	Sterile.
9	14th	Negative	Not done	Not done.
	25th	1 in 250	1 in 125	<i>B. typhosus.</i>
	27th	1 in 250	1 in 125	Not done.
10	6th	Negative	Negative	<i>B. typhosus.</i>
	28th	Negative	Not done	Not done.
	43rd	1 in 50	Not done	Not done.
	46th	1 in 125	Not done	Not done.
11	9th	1 in 125	1 in 125	<i>B. typhosus.</i>
	20th	1 in 250	1 in 250	Not done.
12	14th	1 in 125	Negative	<i>B. typhosus.</i>
	26th	1 in 50	1 in 250	<i>B. typhosus.</i>
13	8th	Negative	Negative	<i>B. typhosus.</i>
	16th	1 in 250	1 in 250	Not done.
14	10th	1 in 250	1 in 50	<i>B. typhosus.</i>
	28th	1 in 250	Negative	Sterile.
15	23rd	1 in 125	Negative	Sterile.
16	?	1 in 250	Negative	Sterile.
17	22nd	1 in 250	Negative	Sterile.
18	8th	1 in 125	1 in 50	<i>B. typhosus.</i>
	13th	1 in 250	1 in 250	Not done.
19	8th	1 in 50	1 in 50	<i>B. typhosus.</i>
	13th	1 in 125	1 in 125	<i>B. typhosus.</i>
20	?	1 in 250	1 in 50	<i>B. typhosus.</i>
	10 days later.	1 in 250	1 in 250	Sterile.
21	?	1 in 250	Negative	<i>B. typhosus.</i>
	13 days later.	1 in 250	1 in 250	Sterile.
22	8th	1 in 50	Negative	<i>B. typhosus.</i>
23	16th	1 in 50	1 in 125	<i>B. typhosus.</i>
24	?	1 in 250	1 in 125	<i>B. typhosus.</i>
25	7th	1 in 250	Negative	<i>B. typhosus.</i>
26	20th	1 in 50	1 in 125	Sterile.
27	7th	Negative	Negative	<i>B. typhosus.</i>
28	18th	1 in 125	1 in 125	Sterile.

TABLE B—concl'd.

Serial number	Day of fever	H-Widal	O-Widal	Clot culture
29	17th	1 in 250	1 in 125	Sterile.
30	?	1 in 125	Negative	Sterile.
31	?	1 in 50	1 in 50	Sterile.
32	?	1 in 250	Negative	Sterile.
33	11th	Negative	Negative	<i>B. typhosus.</i>
34	?	1 in 250	Negative	Sterile.
35	6th	Negative	Negative	<i>B. typhosus.</i>
36	9th	1 in 125	Negative	Contam.
37	?	1 in 50	1 in 125	Sterile.
38	10th	1 in 125	1 in 125	<i>B. typhosus.</i>

Note.—Nos. 2, 3, 11, 20 and 21 were all very severe cases and their condition became very low during the course of the disease.

No. 6:—*B. typhosus* was isolated from the urine on the 37th day.

No. 18:—This patient had fits and paresis of the extremities during the fever. Paratyphoid A 1 in 250 on the 8th day and 1 in 25 on the 13th day.

Summary and conclusions

1. Somatic agglutinins play a very important rôle in the immunology of enteric fevers, and particularly in typhoid fever. By estimation of the titre during the course of the infection, at very critical junctures in clinical prognosis it is possible to forecast with considerable accuracy the chances of life or otherwise for the patient. It is essential to consider the findings of O-Widal and the clot culture together from the same sample in interpreting the significance of the presence or absence of O-agglutinins. Their absence in the second week, combined with the presence of the causative organism in the blood, should arouse grave suspicion as regards the immunological response of the patient. Absence of O-agglutinins in the third week of typhoid fever with a negative clot culture may be looked upon as a natural termination of events.

2. Small-flaking or O-agglutinins play a very inconspicuous part in the sero-diagnostic of typhoid fever, especially in this part of the country (Bombay), and therefore it appears unnecessary to make use of the O-agglutination test as a routine measure, provided the combined method of clot culture and H-agglutination test from the same sample of blood is followed. Incidence of inoculated cases also being small, as compared with other advanced countries, there will be very few chances of discrepancies in the Dreyer's method of Widal test.

Even in inoculated persons suffering from typhoid fever, it is advisable to follow this combined method of clot culture and Widal reaction as then the clot culture will settle the diagnosis irrespective of O- and H-agglutinins.

Before concluding, I desire to express my gratitude to the Professor of Bacteriology and to the Professor of Pathology, Grant Medical

College, Bombay, for allowing me to carry on this work and helping me at every stage, and to the other members of the staff of the bacteriology department for the whole-hearted assistance they had given to me.

REFERENCES

- Burnet, F. M. (1924). *Brit. Journ. Exper. Path.*, Vol. V, p. 251.
 Felix, A. (1929). *Journ. Hyg.*, Vol. XXVIII, p. 418.
 Felix, A. (1930). *Lancet*, Vol. I, p. 505.
 Felix, A., and Olitzki, L. (1928). *Journ. Hyg.*, Vol. XXVIII, p. 55.
 Gardner, A. D. (1929). *Journ. Hyg.*, Vol. XXVIII, p. 376.
 Gardner, A. D. (1930). *Lancet*, Vol. I, p. 427.
 Lister, S. (1930). *Annual Report for the year 1929 of the South African Institute for Medical Research*, Johannesburg.
 Medical Research Council (1931). *A System of Bacteriology in Relation to Medicine*. Vol. VI. His Majesty's Stationery Office, London.
 Pijper, A. (1930). *Journ. Hyg.*, Vol. XXIX, p. 380.
 Soman, D. W. (1932). *Indian Med. Gaz.*, Vol. LXVII, p. 15.
 Stuart, G., and Krikorian, K. S. (1928). *Journ. Hyg.*, Vol. XXVIII, p. 105.
 Topley, W. W. C., and Wilson, G. S. (1929). *The Principles of Bacteriology and Immunity*. Edward Arnold and Co., London.

SOME OBSERVATIONS AFTER SPLENECTOMY IN RABBITS

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THE rôle of spleen on the cholesterol metabolism has not been fully ascertained as yet. Different results have been obtained by different workers regarding the cholesterol content of the blood after splenectomy. Combes (1928) found that splenectomy was followed by a temporary fall in the blood cholesterol. Frenczell and Nekludow (1928) found that splenectomy in dogs, cats and rabbits was followed by hypercholesterinaemia. According to Bugnard (1929) cholesterol in the blood is increased after splenectomy. In the face of these contradictory results, it seemed justifiable to carry out further experimental work to elucidate the relationship

of the spleen to lipid metabolism, and hence the present work was undertaken.

Splenectomy was done on eight rabbits (under chloroform anaesthesia) by an oblique incision along the left interior costal margin, about an inch and a half long. When the peritoneum was opened after cutting through the skin and muscle, the spleen lying on the gastric wall at once came into sight. The spleen was held up and all the branches of the splenic artery were tied separately. The spleen was finally removed and the muscles and skin were sutured, the former by catgut and the latter by silkworm gut. The wound, as a rule, healed by first intention and the sutures were removed on the tenth day after operation.

Blood was collected from an incision on the ear veins and the cholesterol content was estimated, by the Leiboff's method modified by Banerji (1933), once every week. Total counts for red blood and white blood corpuscles, haemoglobin content and reticulocyte count were also done and recorded at the same time.

The following table and graph show the average red blood cell count, haemoglobin content, colour index, white blood cell count, and the reticulocyte counts of the eight animals after splenectomy.

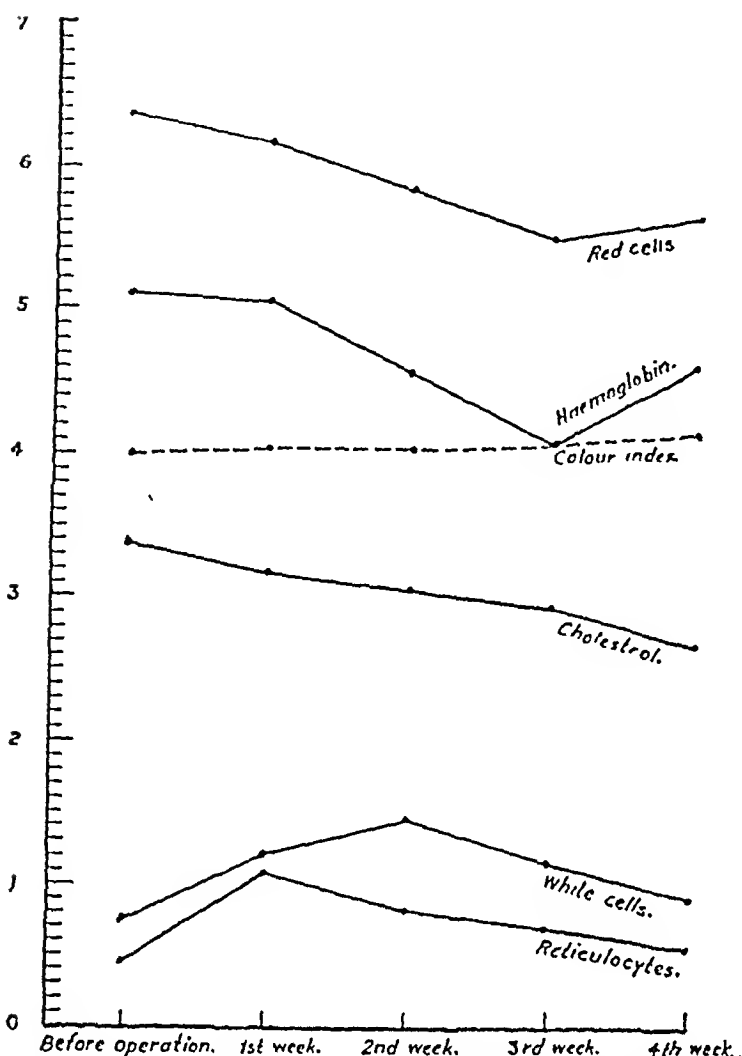
From this, it is obvious that splenectomy was followed by anaemia, both the red blood cell count and haemoglobin content being steadily diminished till one month, after which both of them went up again. There was a steady fall in the cholesterol content of the blood too, which ran parallel with the diminution of the red blood cell count and haemoglobin content. The colour index remained steady during the month following the splenectomy which showed that the haemoglobin content of each corpuscle remained constant. From the fourth week onwards, there was again a tendency for the red blood cell count and haemoglobin to rise, whereas the cholesterol content still continued to fall.

The white blood cell count at the same time steadily went up until the sixth week when it began to fall again. The reticulocytic count showed a sudden flaring up just after the splenectomy, but it came down gradually, reaching its normal level by the fourth week.

TABLE

Week	Red blood cell	Hæmoglobin	Colour index	White blood cell	Reticulo-cytes	Cholesterol
Before operation	6,342,142	101	0.8	7,186	2.15	67.4
First week	6,148,571	100.7	0.81	12,057	5.4	63.55
Second week	5,837,328	95.7	0.81	14,312	4.05	61.3
Third week	5,520,000	91	0.82	11,458	3.45	58.7
Fourth week	5,720,000	95.4	0.84	9,062	2.24	53.8

GRAPH



Red cells — unit	..	1,000,000 cells per c.mm.
Hæmoglobin "	..	20 per cent.
Colour index "	..	0.2.
Cholesterol "	..	20
White cells "	..	10,000 cells per c.mm.
Reticulocytes "	..	5 per cent.

Discussion

Many observers, *e.g.*, Pearce, Krumbhaar, and Frazier (1918), have observed temporary anæmia of the secondary type after splenectomy, but experimental results in our hands show that though there was a fall in the red blood cell count and diminution in the hæmoglobin content, the former remained about five and a half millions and the hæmoglobin content did not fall below 91 per cent, the colour index remaining almost the same. These facts clearly show that there was no true anæmia after splenectomy.

The fall in the cholesterol content was due to the diminution of the red blood cell count. As there was no rise in the cholesterol content, the slight diminution in the red blood cell count can not be explained as due to increased destruction of the red blood corpuscles. Increase in the white blood corpuscle and reticulocyte counts points towards an increased formation of these corpuscles. This is quite contrary to Krumbhaar's belief (1926) that probably the spleen gives rise to some substance which has a

stimulating influence on the red bone marrow cells. The increase in the white blood cell count was mainly due to increase in the number of polymorphonuclear cells, most of which belonged to the first and second groups of the Arneeth count, that is, they were recently-developed cells.

Curiously enough, in spite of the increase in the reticulocytic count the red blood cell count went down, a fact that has yet to be explained.

Summary

Splenectomy was performed on eight rabbits and certain hæmatological observations were made at weekly intervals; the results can be summarized, as follows:—

The cholesterol content fell slightly but steadily.

There is no anæmia though the red blood corpuscle count and the hæmoglobin content too showed slight diminution.

There was an increase in the white blood cell count and the reticulocytic count, showing a stimulation of the marrow activity after splenectomy.

REFERENCES

- Banerji, H. N. (1933). A Simple Method for the Determination of Cholesterol in Blood. *Journ. Indian Chem. Soc.*, Vol. X, p. 573.
- Bugnard, L. (1929). Variations de la cholestérine de la viscosité et du pH du sang après la splénectomie. *Compt. Rend. Soc. Biol.*, Vol. CI, p. 546.
- Combes, T. J. (1928). Bazo y metabolismo de los lípidos; los lípidos en la sangre después de la esplenectomia. *Rev. Med. del Rosario*, Vol. XVIII, p. 338.
- Frencckell, G., and Necludow, V. N. (1928). Experimentelle Studien zur Frage der hamolytischen Funktion der Milz; über den Zusammenhang zwischen den Resistenzschwankungen der Erythrocyten und dem cholesteringehalt des Blutes unter dem Einfluss der Splenektomie. *Arch. ges. Physiol.*, Vol. CCXX, p. 356.
- Krumbhaar, E. B. (1926). Functions of Spleen. *Physiol. Rev.*, Vol. VI, p. 160.
- Pearce, R. M., Krumbhaar, E. B., and Frazier, C. H. (1918). *The Spleen and Anæmia*. J. B. Lippincott Company, Philadelphia.

A Mirror of Hospital Practice

TWO CASES OF PERIPHERAL NEURITIS TREATED BY INTRAVENOUS INJECTIONS OF SODIUM IODIDE

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THESE cases were the result of influenza which prevailed in the towns and villages of Mahikantha in an epidemic form in the months of January, February and March of this year.

The object of reporting them is to show that, in cases which were quite helpless, the effect of intravenous injections was striking, the patients showing improvement within twenty-four hours after the first injection.

Clinical history

Case 1.—A Sikh youth, aged 22 years, was admitted to the civil hospital, Sadra, for an attack of fever and cough following a game of hockey. The temperature on admission was 101°F., the pharynx was congested and râles were heard over the base of the left lung. On the 25th January, 1934, the patient began to complain of tingling sensation in both the upper and lower extremities. On the 28th the lower extremities could not support the body-weight. On the 1st February the patient developed anaesthesia of both upper and lower extremities. The general reflexes were lost but the bladder and rectum were unaffected.

Condition of the patient before the treatment was started.—The patient was quite helpless, could not raise himself in bed without support, or stand even when supported; he was unable to grip an object with his hands. General reflexes were lost but the bladder and rectum were unaffected.

Treatment.—Intravenous injections of sodium iodide—15 grains in 10 cubic centimetres of distilled water—were started on the 15th February and were repeated on alternate days. Twenty-four hours after the first injection the patient began to feel stronger; the anaesthesia gradually disappeared, and his grip became firmer. The upper extremities improved earlier than the lower and he was up and moving about in a fortnight. He was given fourteen injections in all and was discharged cured.

Case 2.—An adult, 35 years of age, was admitted into the civil hospital, Sadra, on 2nd March, 1934, with a history of fever, cough and naso-pharyngeal catarrh of fifteen days' duration. On the fourth day of his illness, he began to notice numbness and tingling in both his upper and lower extremities.

Condition on admission.—The patient had a temperature of 100°F., the grip of both hands was weak; he could neither raise his arms nor raise himself in bed without help. He could not stand although he could move his limbs; knee jerks were somewhat exaggerated; ankle clonus and triceps reflex were absent.

Being encouraged by the result of the first case, intravenous injections of sodium iodide in fifteen-grain doses were started and were repeated every other day. The first injection was given on the 3rd March. On the 5th the upper extremity began to show signs of improvement. On the 7th he could raise his left arm fully and on the 9th he could sit in bed without help. He went on improving steadily, the right arm being the last to recover and he was discharged completely cured on the 22nd March, i.e., on the 19th day after the treatment was started. In all he had ten injections.

A CASE OF CEREBRAL MENINGEAL HÆMORRHAGE

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THE following case appears worthy of record as it illustrates the great diagnostic importance of lumbar puncture in cases of cerebral meningeal hæmorrhage, and shows also how such punctures may assist greatly in the treatment of meningeal hæmorrhage :

A man was admitted into the North-Western Railway hospital, Delhi, on the 4th February, 1934, in an unconscious state with a temperature of 101.4°F. The tongue was thickly furred and the pupils reacted to light. He was given a soap-and-water enema on admission but without satisfactory result. A blood film was prepared and examined for malarial parasites but was found to be negative. Next morning the temperature was 99.4°F. and his condition remained the same. At times he regained consciousness for short intervals

and was given nourishment. A soap-and-water enema was repeated but without any greater success than on the former occasion.

The temperature rose to 100.4°F. in the evening, the breathing became stertorous and his condition appeared grave at about midnight. There were signs of passive congestion of the right eyeball and paresis of some of the ocular muscles of the right eye; the pupil was dilated and proptosis was present.

The temperature was now 102.2°F. Twitching of the head and left arm was noticed. I suspected meningeal hæmorrhage and decided to do a lumbar puncture to confirm the diagnosis. About 50 cubic centimetres of cerebrospinal fluid were drawn off. The first 20 cubic centimetres of fluid came out under great pressure but it was quite clear in appearance. The remaining 30 cubic centimetres were blood-stained. The diagnosis of intradural cerebral hæmorrhage having been made it was decided to trephine the skull and remove any blood clot. A few hours later however, when I visited the hospital for this purpose, a great improvement in the patient's condition was noticed. The breathing was quiet. The passive congestion of the right eyeball had almost disappeared. The patient was quite conscious and no twitching of the fingers, etc., was noticed. The temperature had dropped to 99°F. It was considered advisable to postpone trephining the skull and to keep him under observation for a few days. Recovery was rapid and uneventful so that he was able to return to his work two weeks later.

My thanks are due to the Chief Medical and Health Officer, North Western Railway, Lahore, for his permission to publish this case.

LYMPHADENITIS OF THE RETROPERITONEAL GLANDS SIMULATING APPENDICITIS

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THE following cases are of interest not only on account of the comparative rarity of the condition, but also because of the difficulty experienced at an accurate clinical diagnosis :

Case 1.—An Ooriya boy, aged 16, was admitted as an in-patient to the Amoragori Charitable Dispensary suffering from pain in the right groin, thigh and knee. He had been unable to walk for two days. On admission his temperature was 100°F. His right hip was flexed to an angle of 45 degrees and extension was very limited and painful; tenderness in the right iliac fossa was very marked and a few enlarged inguinal glands were found. The abdomen moved well. The spine appeared normal. Rectal examination showed marked tenderness on the right side, but a mass was not felt. The bowels had been constipated and an action was secured on the day of admission by the use of castor oil.

Case 2.—A boy, aged 4 years, was brought to the out-door department when I was a medical officer of the Bargachia Thana Charitable Dispensary. He was limping and constipated and had previously complained of pain in the right hip. His temperature had fluctuated between 100 to 102°F. for at least a week. The extension of the right leg was limited and painful. There was slight rigidity in the right iliac fossa and above the pubis and tenderness over the abdomen which was very marked over McBurney's point. The right inguinal glands were slightly enlarged and painful. Rectal examination revealed tenderness high up on the right side, but no lump was detected. Nothing abnormal could be seen or felt in the spine or loin.

Differential diagnosis

In neither of the cases was a correct diagnosis made at first. The presence of lymphadenitis of the retroperitoneal glands was not recognized; they were diagnosed as an appendicitis. The insidious onset and absence of marked and progressive signs of peritonitis, in spite of continued temperature, distinguished it from appendicitis. As regards arthritis of the hip joint, a condition which is characterized by the immovability of the joint, a careful examination showed that all the movements could be made painless if the hip were held in flexion. Fibrositis of the loin muscles was a very common cause of pain in this region but no nodules of fibrous tissue could be palpated when the muscles were relaxed.

Case 2 was a type of mesenteric adenitis common in children, usually simulating appendicitis. The sudden rise of temperature as in this case along with relatively less signs of toxicity served to differentiate it from appendicitis.

The question of Pott's disease may possibly be considered but there was no loss of mobility of the spine, when the patient was sitting, consequently this was an argument for excluding the spine as the seat of the disease.

Psoas abscess, arising from tuberculous or pyogenic adenitis of the retroperitoneal glands, might suggest itself. The absence of swelling and fluctuation followed by a rapid recovery after rest and treatment with antiphlogistine excluded this possibility. The evidence in general pointed to a simple adenitis with abscess formation.

[Note.—Though the writer may be quite correct in his diagnosis, the evidence he adduces is not entirely convincing. No mention is made of the abdomen having been opened. It would of course not have been to the advantage of the patients had this been done, but it would have confirmed the diagnosis.—EDITOR, I.M.G.]

A CASE OF ENTERIC FEVER

By D. SUNDERARAJ, L.M.P.

Honorary Clinical Assistant, St. Bartholomew's Hospital, Ootacamund

BELOW is a record of a case of enteric fever beginning as an osteomyelitis, a phenomenon of great interest and of no less importance despite the fact that such a condition is rare:

The patient, a female child, aged 10 years, was admitted into our hospital on account of a high fever and painful swelling on the dorsal aspect of the left foot. On admission the temperature was 104°F., pulse—138 and respiration—40.

Surgical measures were adopted as treatment in scraping away the necrosed part of the metatarsal bone. The recovery of the local condition followed rapidly but the high temperature was singularly persistent and was accompanied by morning remissions.

In spite of the healthy post-operative wound, the temperature remained at the same level for a period of eight weeks, oscillating however between morning temperatures of 99° to 100°F., and evening temperatures of 104° to 105°F. It then gradually fell to normal by lysis.

Examinations of the blood at frequent intervals revealed an increase in the lymphocytic count, the maximum being 80 per cent during the third week of the febrile period.

Differential count of white blood cell—

	First week	Third week	Sixth week
	Per cent	Per cent	Per cent
Polymorphonuclears ..	64	12	59
Lymphocytes ..	24	80	36
Large mononuclears ..	10	5	3
Eosinophils ..	2	3	2
Basophils ..	..	..	..

Specimens of blood withdrawn from the vein, thrice during the course of the disease, were tested for the Widal reaction, the last two specimens proving positive.

Results of Widal reaction—

Third week	Fifth week	Seventh week
Negative	<i>B. typhosus</i> , positive 1 in 100.	<i>B. typhosus</i> , positive 1 in 200.
	<i>B. paratyphosus</i> , A, positive 1 in 25.	<i>B. paratyphosus</i> , positive 1 in 50.

The enlargement of the spleen was marked. The organ remained enlarged during the third week of illness to a breadth of two fingers below the costal margin.

The patient was treated as a case of enteric soon after her admission into the hospital after eliminating all possible causes of persistent pyrexia simulating enteric fever. This provisional diagnosis was confirmed later by an increased lymphocytic count, an enlarged tender spleen and positive Widal reaction.

In conclusion, I believe that it is possible for enteric fever to set in as osteomyelitis although such a bony lesion at the very onset of enteric fever is extremely rare.

I am indebted to our superintendent, Lieut.-Colonel A. S. Leslie, I.M.S., for having kindly permitted me to make use of the notes from the hospital.

AN UNUSUAL CASE OF STRANGULATED HERNIA

By S. V. SAHASRABUDHE, S.M.S.

Sub-charge, Civil Hospital, Satara

A WOMAN from a local village was admitted to the Satara civil hospital, on account of the strangulation of the lower abdominal wall. She had a brass pot sticking firmly on to the abdominal wall, with the protrusion projecting through the narrow neck of the pot. The condition of the strangled portion was blue and tense with blisters appearing on to the surface. On enquiry it was found that she had used the pot 'Tapeli' as a dry cup to relieve the pain in the abdomen.

When the hernia became strangled the villagers had cut open the base of the pot with the idea of relieving the patient but without effect. I chloroformed the woman and introduced castor oil over the projecting portion through the opened-up base to make it slippery and eventually succeeded in relieving the woman. The duration of the strangulation was five hours. She was discharged cured the next day.

This case illustrates how a narrow-necked pot is likely to be dangerous even although it is widely used as a country method of cupping.

Indian Medical Gazette

OCTOBER

INTRAVENOUS VERSUS INTRAMUSCULAR QUININE

For a number of years, certainly for the last twenty, there has been an official ban on intramuscular quinine. Textbooks, teachers and even regulations have been uncompromising in their condemnation of this method of administering quinine. Research workers have been called in evidence and have supported strongly this official attitude; they have shown that the injected quinine solution causes local necrosis so that the slightest sepsis will lead to abscess formation and possibly extensive tissue destruction; even in the absence of extraneous infection, endogenous infection may lead to the same result; and finally (the most terrifying bogey of all) enterogenous tetanus is held up, not as a theoretical possibility but as an experimental probability. Yet despite this unanimous teaching, despite these repeated warnings, despite even actual threats—the statement that giving of an intramuscular injection amounts almost to malpraxis—many of the most observant and careful practitioners throughout the length and breadth of this country, and probably of many other countries as well, continue to give intramuscular injections without the slightest hesitation when they consider that the special circumstances demand it.

Such a widespread exhibition of perversity in the medical profession should not, we feel, be overlooked. The pundits must assert themselves; they must either establish their case by scientific examination of the clinical experience of those who still persist in flouting their authority, or by repeating their experiments and providing even more convincing evidence in support of their contentions or, should they find that there had been any flaws in the interpretation of their experiments, withdraw from their present uncompromising position.

In other words, we consider that it is time that the question of intramuscular—that is, intramuscular *versus* intravenous—quinine was reopened. We stress 'intramuscular *versus* intravenous' because we do not believe that there is any need for the question of oral *versus* intramuscular quinine to be raised, nor that the routine administration of quinine by the intramuscular route can be too emphatically condemned. Oral administration is the method of choice and it is only in special circumstances that parenteral* administration is indicated;

there is certain to be some difference of opinion as to what constitute these special circumstances—some practitioners will produce their syringes on the slightest provocation, whereas others will adhere to the oral method until their patients are comatose. The parenteral route is indicated in case of emergency, that is to say cases in which one cannot afford to risk the possible delays of the oral route, *e.g.*, cases of heavy malignant tertian infection, and/or cases with hyperpyrexia or cerebral symptoms, in cases with persistent vomiting, and in other cases where one doubts the ability or the will of the patients to swallow, retain or absorb a suitable dose of cinchona alkaloids or other antimalarial drugs. In all other circumstances the drug should be given by the oral route; normally the absorption of the drug from the stomach is so rapid that little time is to be gained by giving it intravenously, and possibly less by giving it intramuscularly, but it is the risk of the possible rejection of the drug or of delay in its absorption that one cannot afford to take in certain cases.

The question of the danger of tetanus is a very difficult one; danger there undoubtedly is, as there is in any minor surgical procedure or in crossing a road. But we do not abandon minor surgery, nor remain always on one side of a road on this account. It is all a matter of the extent of the danger. Then the question arises. Can the danger be obviated by the exercise of care? The answer is that in none of our three examples can it be obviated entirely, but it can be reduced very considerably. With the exercise of scrupulous care the danger of introducing tetanus spores can be reduced to zero, but there is still the possibility of endogenous infection of the site. The case for this is largely dependent on theory; all experiments that are cited in support were conducted many years ago and some of them have been questioned. We then come to the clinical evidence; cases of tetanus following intramuscular injections have been reported—Semple collected ten such cases—but, in view of the vast number of injections that are given annually, this is not a very significant number. Semple, who was a great opponent of intramuscular quinine, brings human nature into his argument and says that clinicians hesitate to report deaths following their quinine injections. This is an argument that can be turned against him; we can imagine a clinician reporting a case of tetanus but we cannot imagine him admitting that it was probably due to his own carelessness. There is another point in this connection, though a clinician might hesitate to announce such a disaster from the house-tops, he would certainly discontinue to give intramuscular injections of quinine and would privately warn his friends of their dangers.

On the other hand it is not sufficient for a practitioner to say 'I have given so many

* We use this word as meaning 'in some other way than by the intestinal canal'.

Recently a writer on this subject made a distinction between intravenous and parenteral injections.

hundreds (or even thousands) of intramuscular injections of quinine and have never had a case of tetanus yet; therefore the practice is a safe one'. A man does not say 'I frequently cross roads; I am still alive; therefore it is quite safe to cross roads', and we know of no ethical law that allows each doctor one death for each procedure that he adopts before he discontinues it. The first part of the practitioner's statement is useful as evidence to be added to that of others, and it is only by the collection and statistical examination of such evidence that the case will be judged.

In the matter of less serious complications, such as abscess formation or extensive necrosis, we can give more weight to the evidence of the individual practitioner, and the experience of the majority seems to indicate that these accidents are rare if proper precautions are taken. Here, we feel, clinical experience should be allowed to override laboratory experiment. There is no doubt that quinine in the usual strengths injected into the muscles of animals—rabbits have usually been used—does cause necrosis, and it seems quite possible that some degree of necrosis follows these injections in man; the point to be settled, however, is whether this necrosis assumes any clinical importance, and this can be settled more satisfactorily in the field than in the laboratory.

A good deal of evidence has been produced to show that quinine injected into the muscles is absorbed very slowly—the fact has been claimed both as an advantage and as a disadvantage of this method of administration. We have not examined all the experimental evidence on this point but in most cases the argument depends on the injection of relatively huge doses into animals, after which it is shown that the majority of the quinine can still be recovered from the site of injection after varying intervals. A recent re-investigation of this point (reported on page 560 of this issue of the *Gazette*) has brought to light some very interesting facts. Therapeutic doses—in contradistinction to large experimental doses—were injected into monkeys by the intramuscular and by the intravenous route, and at intervals from fifteen minutes to twenty-four hours their blood was examined for quinine, quantitatively. At the end of fifteen minutes the amount of quinine in the blood was the same whether it had been injected intramuscularly or intravenously; at half an hour, at one hour and at two hours, the amounts were still the same in each group but at the end of five hours more quinine was present in the blood of the intramuscular group, and at the end of twenty-four hours it was only recovered in one case, and this one was in the intramuscular group. A few similar experiments on man indicated that the time of first appearance in and disappearance from the blood of quinine was much the same as in the monkey.

Given by the oral route, quinine was recoverable from the blood after fifteen minutes, but it was present in smaller quantities than when given by either of the other routes. These findings are far more in accord with clinical experience than were earlier experiments, and will help to narrow the gap between the laboratory and the field.

We will now examine the other side of the picture. Intravenous therapy generally is very popular in the medical profession; neosalvarsan and allied arsenicals are responsible for laying the foundation of this popularity, and in areas where kala-azar is endemic, the antimony preparations for establishing it, the list of medicaments that are given by this route increases daily. The pain associated with an intravenous injection is much less than that with an intramuscular injection, so that on this score they should be popular with patients, and as a general rule they are. This general rule does not however seem to apply in the case of quinine; intravenous quinine injections are popular with neither patient nor doctor, but it is very hard to find out the exact reason for this unpopularity. The fall of blood pressure that accompanies an intravenous injection causes a feeling of faintness in the patient and very often alarms the doctor, but there is seldom anything more definite than this to be said. Elsewhere in this number will be found a paper in which the writer uses intravenous quinine apparently as a routine measure; we do not consider that this is either necessary or justifiable, but we publish his results to show that it is possible to overcome this prejudice against intravenous quinine, and, even outside the Royal Army Medical Corps and research institutions, to become sufficiently enthusiastic to use it to the exclusion of all other methods.

During the last few months, without actually issuing a questionnaire, we have asked the opinion of a number of practitioners in different parts of the country regarding the respective merits of intramuscular and intravenous quinine. A few have replied that, though they seldom give either, they prefer the intravenous route, but the majority—the vast majority—give a reply definitely in favour of the intramuscular route. Many said that they gave intravenous injections in cases of extreme urgency, but others said that they had had, or had heard of, deaths following intravenous injections and that on no account would they give them. One reply took the form of a short note which we are publishing elsewhere in this issue; this is typical of the opinions expressed.

Let us once more make it quite clear that we are not raising the question of oral *versus* parenteral quinine. There can be no possible doubt that in ninety-nine occasions out of a hundred the oral is the route of choice and to give quinine intramuscularly as a routine is a

gross abuse. But we are not at all sure that the wholesale and indiscriminate condemnation

of intramuscular quinine has not helped to undermine authority and keep alive this abuse.

Medical News

RAI SHAMBHU DAYAL SAHIB GOLD MEDAL

(1) A gold medal called the 'Rai Shambhu Dayal Sahib Gold Medal' will be presented for the best prize essay on a public health subject to be announced each year.

(2) The subject of the next essay is 'A scheme for the improvement of milk supplies in Indian towns'.

(3) The competition will be open to the general public including the medical, and the public health workers in the United Provinces.

(4) The essay is to be written in Hindi and should not exceed 3,000 words in length.

(5) Essays should reach the Medical Officer in charge, Provincial Hygiene Institute, United Provinces, Lucknow, by 15th November, 1934.

(6) The name and address of the competitor must be distinctly written on each essay submitted and the envelope should have the words 'Prize Essay' in the top left-hand corner.

(7) The Director of Public Health, United Provinces, shall judge the merit of the essay and his decision with regard to the award of the medal shall be final.

(8) No correspondence will be entered into on the subject of competition.

(9) No essay will be returned.

MANSON-ROSS RECEPTION

On 29th June, a reception was held at the London School of Tropical Medicine and Hygiene to celebrate the incorporation of the Ross Institute in the London School, and to do honour to two famous pioneers in tropical medicine, Patrick Manson and Ronald Ross.

An important function at this reception was the unveiling of a medallion and bust of these two great men which have been presented to the school. This ceremony was performed by the Right Hon. the Earl of Athlone, K.G., whose speech on this occasion we give below:—

'This evening we do honour at one and the same time to the memories of two of our greatest and most famous men, Patrick Manson and Ronald Ross.

We do honour to the memory of the one because, after his labours overseas alone and ill equipped, he had the vision and the courage to inspire and mould teaching and research in Tropical Medicine and to lay the foundations of a nobly-conceived centre of education.

The other to whom we do honour was in turn inspired by the Father of Modern Tropical Medicine, and, through toil and pain and strain, brought to mankind—and especially to the teeming millions of the tropics—a wonderful and priceless gift and we are reminded to-day that he, at the moment of his great discovery, when he wrote his inspired poem, turned at the same moment to write to the other great man to whom he owed so much: "My one wish is that you were here to share with me the pleasure which I have experienced yesterday and to-day in seeing your induction being verified step by step".

PATRICK MANSON, 1844-1922

Manson was a pioneer in the untrodden paths of medicine. He was a great doctor in every sense of the word and in every branch of his profession—although he styled himself "not so much a good surgeon as a good carpenter".

He left Scotland in 1865 at the age of 21 and went to Formosa, working there and in China for nearly a quarter of a century.

Few now can realize what such isolation meant, isolation in every sense; he had no books, no helpful companionship, no one but his own native intuition to consult. All these circumstances combined to make Manson the pioneer upon a vast uncharted field of medicine which lay at his feet, and there he taught himself to look down his primitive microscope and seek out the secrets for himself.

It came about that in the town of Amoy in 1877 he "stumbled upon an important fact with a distinct bearing on pathology"—a fact which was to unlock a new world—a fact which influenced the conception of the conveyance of disease, because he was able to discover by laborious experiment that a blood-sucking insect—the mosquito—acted as a nurse in propagating disease of man—the filaria worm.

Manson had no knowledge of the anatomy of insects and he had no instruments save a pen nib to carry out this fine work. He made great discoveries and described some half a dozen new parasites of man and several new diseases. No less ardent was he in seeking out new remedies—yet he was able to write "Men like myself are but poor and slow investigators crippled as we are with the necessity of making our daily bread".

About the year 1897 when Manson had been resident in London about seven years, he set himself to found and inspire the London School of Tropical Medicine, and on 1st October of that year he set out his scheme in an address at St. George's Hospital. In that address he gave the outlines of teaching and research in Tropical Medicine—in fact he laid down the lines upon which the instruction in the present school is based.

In due course he laid his scheme before Mr. Joseph Chamberlain, whose heart had been grieved with the great loss of useful lives on Government service on the West Coast of Africa. This great and far-seeing statesman at once appreciated the significance of these proposals with the result that within two years the original London School of Tropical Medicine was built and organized under the aegis of the Seamen's Hospital Society, with Manson as its presiding genius.

Here is a touch of self revelation, as contained in advice given by Sir Patrick Manson to his students:

"Never refuse to see what you do not want to see, or what might go against your own cherished hypotheses. These are just the clues to follow up, as is also, and emphatically so, the thing you have never seen before. The thing you cannot find a pigeon-hole for is the finger-point showing the way to discovery".

Manson was greatly distinguished in his career, absorbed in many fascinating scientific problems, honoured as an oracle in the school of his own creation. Some of his finest qualities were revealed in his handling of native races. He loved sport and good literature; he was fortunate in his home; his was a full and happy life, and his good deeds do follow him.

I unveil this tablet to the memory of Patrick Manson.

It is fitting that this memorial should find its permanent resting place in the central hall of this building, opposite the tablet which some little time ago I unveiled in honour of the memory of Andrew Balfour, that well-beloved man who was the first Director of this great school.

I have now the signal honour to receive this beautiful medallion and tablet from the widow and family of Sir Patrick Manson, and to ask Sir Herbert Read on

behalf of Sir Austen Chamberlain, the Governors, the Board of Management, and the Staff of the school, to hold it in safe keeping for all time.

RONALD ROSS, 1857-1932

Of the many debts which the Empire owes to Manson, not the least is that it was he who gave inspiration to Ronald Ross and pointed the road along which he travelled towards his great discovery.

In September, 1932, the whole Empire mourned the death of Ronald Ross. To-day, when we again recall his magnificent conquest of malaria, we do so on the occasion of the incorporation in this noble institution of the Institute which bore his name. The school is enriched by the addition of a great department of tropical hygiene which brings with it no substantial endowment in terms of money, but the priceless inheritance of the spirit of Ronald Ross and a zeal and courage to carry on that great warfare against Malaria which, after all, was the aim and the work of Ross throughout his life.

Ross had a fitting birthplace for one who was to tower above his fellow men in his genius, his patience, and his high moral courage. At Almora, in the Himalayas, where he was born, there were peace and pleasant coolness and everchanging views of the snows of the loftiest peaks of the world. In his school days he was, as he has told us, not interested in medicine—he wished to become an artist. Although he began the study of medicine at St. Bartholomew's Hospital, he was much more interested in philosophy, poetry, mathematics and in music than in medicine. When many years later he turned to the serious study of disease and to that branch of science in which he was to attain supreme distinction, he concentrated on the prevention of disease.

After entering the Indian Medical Service there began to sink into the mind of Ross the misery of life in India; the sad tale of poverty, of famine and of death. His reaction to this became more intense as the years passed.

Ross found the work of his life. He saw that many of the diseases of India were preventable, that disease was one of the chief causes of poverty and distress, that of all the diseases malaria was in many tracts a scourge far greater than either plague or cholera, and caused more sickness, misery, and death than any other disease.

Two strenuous years of work brought no result, but in that time Ross acquired a knowledge of the structure of the mosquito and worked out a technique for examining the insect. He toiled all through the hot weather—Indian hot weather, I would have you remember—but as failure followed failure he became exasperated and worked till he "could hardly see his way home". He tells us of his "dark, hot, little office"; and of the conditions under which he worked. "The screws of my microscope were rusted with sweat from my forehead and hands, and its last remaining eyepiece was cracked!"....."I was tired, and what was the use? I must have examined the stomachs of a thousand mosquitoes by this time. But the Angel of Fate fortunately laid his hand on my head", for under Ross's microscope at that moment was the very thing he sought. He looked—the problem is solved.

The discovery was important not only because it showed how malaria spread; it was hardly less important because it turned men to investigate insects as the carriers of other diseases, and within a few years the germs of yellow fever, relapsing fever, plague, typhus fever and sleeping sickness had all been shown to have insect hosts. Thus does a fundamental discovery open wide the flood-gates of knowledge.

Ross's triumph was more than that of the laboratory worker who after infinite patience and endurance has at last solved an interesting problem of pure science. It was the entry into a new and far more difficult territory which had to be conquered, and he was filled with a devotion to the cause of preventing disease.

King Edward's phrase: "If preventable, why not prevented?" was constantly on his lips and in his mind. He met with difficulties, misunderstandings, intolerable delays of which he was impatient. He did not spare his opponents and took no count of the bitterness which his attacks and challenges often aroused. Future generations will not hold him in less honour on this account.

The problem of antimalaria work is not a biological problem alone; it is also largely a sanitary and engineering problem. As such, it is one which must be dealt with not only by governments and municipalities, but by everybody, from the Director of Public Health to the person responsible for labour in any industry, and even to the chief of a village, all working in co-operation. The measures for stamping out this dreadful, wasteful disease must go forward everywhere with determination, with courage, and with high hope. That way lies the true path along which the workers in this school must go if they are to give Ross a real reward for his sacrifice and his labours, and do real honour to his memory.

I unveil this bust to the memory of Ronald Ross.

In memory of this great man, I accept this finely-executed bust at the hands of the sculptor, Lady Welby, and ask Sir Charles McLeod, the first Chairman of the Ross Institute, to receive it into the safe keeping of this institution; a worthy shrine for the noble memory of a noble man.

Historical note on the London School of Tropical Medicine, and on the Ross Institute

For several years after his return to England from China, Manson had urged that medical men, before proceeding to the tropics, should receive some instruction in the diagnosis, and treatment of tropical diseases, and in 1897 he formulated a scheme for a school of tropical medicine in London. In this year he became Medical Adviser to the Secretary of State for the Colonies, an office then held by Mr. Joseph Chamberlain.

The great mortality among Europeans in such climates as those of the West African colonies had from the first attracted Mr. Chamberlain's notice and his attention was directed by Manson to the importance of scientific enquiry and of special education in tropical medicine for the medical officers of the Crown Colonies.

In 1898 Chamberlain wrote officially to the Board of Management of the Seamen's Hospital Society requesting them to establish a school for the teaching of tropical diseases in connection with their Albert Dock Hospital. The Board acceded to this request. The school was officially opened on the 3rd October, 1899, in a small laboratory built in the grounds of the Albert Dock Hospital. The cost of these buildings and of their equipment was met from a fund of £12,000 raised at a dinner at the Hotel Cecil, on the 10th May, 1899, presided over by Mr. Joseph Chamberlain.

The school at once proved a successful venture and attracted students from all over the world. The premises had to be enlarged and in 1912, in response to an appeal for further funds by Sir Austen Chamberlain, the sum of £73,000 was raised.

In 1900 the school received recognition as a school of the University in the Faculty of Medicine and in 1920 it was moved from the Albert Dock to more commodious premises in the new Hospital for Tropical Diseases, adjoining University College and in close proximity to the proposed headquarters of the University of London. The building was purchased through the generosity of the British Red Cross Society for the treatment of cases of tropical diseases contracted during the Great War.

Although its life as a separate institution was brief, public appreciation of the work of the old London School of Tropical Medicine is shown by the fact that when it became incorporated in the new School of Hygiene which in 1924 received its first Charter as

the London School of Hygiene and Tropical Medicine, the public had subscribed over a quarter of a million pounds sterling for its maintenance.

The new London School of Hygiene and Tropical Medicine, which H. R. H. the Prince of Wales opened in July 1929, was the outcome of the recommendations made in 1921 by the Committee, under the presidency of Lord Athlone, appointed by the Minister of Health of that day. This Committee, finding that the post-graduate teaching of Public Health in London was inadequate and uneconomic, advocated the establishment of a central institution, affiliated to the University of London, wherein full provision should be made for instruction in all branches of preventive medicine. The Rockefeller Foundation then made a generous contribution which included the cost of this building and its equipment.

The original intention was that it should be a school of hygiene and public health, but the advantages of including under the same roof the teaching of tropical medicine and hygiene was obvious and this scheme was soon expanded accordingly, and the school opened with Sir Andrew Balfour as its first director; he was succeeded in 1931 by the present dean, Dr. W. W. Jameson.

The Ross Institute.—It was inevitable that for such a man as Ronald Ross there should be a permanent memorial at the centre of the Empire.

Sir Charles McLeod and his friends, men with wide knowledge of the needs of the tropics, had been impressed with the ravages of malaria overseas, and the great economic handicap it was to tropical industry; and it was mainly through his efforts that the money was raised and the Institute opened by H. R. H. the Prince of Wales in July 1926.

Overseas activities.—In 1928-29, a visit was paid to India by Sir Malcolm Watson and Major Lockwood Stevens, in order that Sir Malcolm, reviewing more closely the conditions in which malaria existed in many parts of India, should report to the Committee if it were possible to create an organization for the study and control of malaria for the tea industry. As a result of this visit, a scheme was drawn up which met with the support of the late Lord Inchcape and a number of other public-spirited men in London. They guaranteed the funds for three years, and at the end of the period the scheme had been so successful that

the Indian Tea Association made itself very largely responsible for financing the work in the future.

The work in India is under Dr. G. C. Ramsay, O.B.E. It illustrates the value of combining practical and scientific work. Dr. Ramsay has organized seven field research laboratories in Northern India and one in Southern India, and has shown that out of the thirty species of anophelids in Northern Bengal and Assam one only is responsible for the spread of malaria, and that this one requires certain conditions for its larval stage. This gives great hope of preventing malaria at a minimum expenditure; the practical results are already sufficiently impressive.

Co-operation.—In its various overseas activities, the staff of the Ross Institute has established contacts with, and welcomes the co-operation of, medical officers in Government service, with estate medical officers, and with others. To many it is indebted for valuable assistance; but special mention should be made of the co-operation of the Government of India and the Calcutta School of Tropical Medicine in investigating the serological reactions of the blood meals of mosquitoes.

The admirable work on anaemia carried out by the Calcutta School of Tropical Medicine is an instance of how a number of scientific bodies can work in one area together for the benefit of the community.

Mention should also be made of the valuable assistance obtained from the South African Institute for Medical Research. Through the courtesy of its Director, Sir Spencer Lister, one of its staff was deputed to carry out an investigation of the causes of pneumonia in copper mines.

Incorporation.—The incorporation of the Ross Institute in the London School of Hygiene and Tropical Medicine has for some time past appeared to be inevitable. From the historical accounts of the School and the Institute which have already been given, no one will be surprised that, quite apart from the financial and economic arguments, there were strong reasons for the amalgamation of the two bodies. Not only had they a common aim, but their spheres of work were complementary; each would provide something that the other desired; each would supplement the work of the other to the advantage of both, and to the advancement of their common object, the welfare of the peoples of the Empire and of the world.

Current Topics

An Improved Test for Occult Blood, Specially in the Urine

By WILLARD J. STONE, M.D.

and

GEORGE T. BURKE, M.D.

(Abstracted from the *Journal of the American Medical Association*, Vol. CII, 12th May, 1934, p. 1549)

ORTHOTOLIDINE was first proposed by E. B. Phelps in 1909 as a qualitative test for minute amounts of free chlorine or hypochlorites in water. It is a crystalline basic body of the aromatic series obtained by reduction from orthonitrotoluene. It has a melting point of 129-130 centigrade and is quite insoluble in distilled water. It is quite soluble in acid solutions and in alcohol and ether. Ruttan and Hardisty in 1912 described the use of orthotolidine as a test for the detection of blood. They used a 4 per cent solution in glacial acetic acid and added a small amount of perhydrol (Merck) as an oxidizing agent to obtain a blue colour in the presence of blood. They stated

that the solution would detect hæmoglobin in a dilution of one part in 7,000,000 parts of water, in a dilution of one part in 24,000 parts of urine, in a dilution of one part in 100,000 parts of faecal material, and of one part in 30,000 parts of stomach contents.

In the course of a search for a new hæmoglobin colour standard, we have found orthotolidine useful in the detection of minute quantities of blood in urinary sediments. It is safe to say that the average laboratory urine report made by technicians rarely mentions the presence of red cells unless the presence of blood is grossly evident. Red blood cells in the sediment are often crenated or disintegrated in urine specimens a few hours old and are confused with leucocytes. The formed elements, including red cells, are frequently disintegrated in alkaline urine. The continued presence of red blood cells in urinary sediments has important clinical significance in that it may attract attention to glomerular inflammatory changes, which are frequently overlooked in the absence of albuminuria or other gross evidences of disturbance. Such observations have especial significance in latent stages of chronic hæmorrhagic Bright's disease (glomerulonephritis). We have

found frequently that red cells were excreted more or less constantly in patients with evident foci of infection. Such observations have important clinical implications of glomerular inflammation. The presence of a few red cells, leucocytes or casts, in the absence of other symptoms, may have little significance following unusual exercise or exertion.

Addis examined a series of healthy students and found, by counting the red cells in the urine, that for twelve-hour night periods the number averaged 65,000 cells. The individual highest count obtained was 425,000 red cells for a twelve-hour period. This would mean, for an average twelve-hour night excretion of about 400 c.c. of urine, that the number of red cells varied approximately between 150 and 1,000 per cubic centimetre. The persistent excretion of 1,000 red cells per cubic centimetre of urine, in our experience, would not be considered within the limits of normal variation and would point toward some source of chronic glomerular irritation. The important point is that such numbers are not recoverable easily by centrifugation, since disintegration or solution frequently has occurred.

Our experiments show apparently that from 50 to 80 per cent of red cells are recoverable. This point need not be considered as settled, since varying degrees of alkalinity and preservation of specimens, as well as the rate of centrifugation, may influence the result. We have considered that 50 per cent of the cells were recoverable as being a useful average in clinical work. The following experiment will illustrate the point:

To 15 c.c. of normal, neutral or slightly acid urine, which had been filtered twice and which contained no microscopic evidence of blood, 75,000 red cells were added. The concentration then was 5,000 cells per cubic centimetre of urine. The 15 c.c. quantity was centrifuged at 1,500 revolutions per minute for five minutes. The amount of sediment obtained was about 0.1 c.c. or 100 c.mm., from which a count was made of the red cells. The count showed that the sediment contained 400 red cells per cubic millimetre. This would be equal to 40,000 red cells in approximately 0.1 c.c. of sediment representing 15 c.c. of urine. In other words, about 40,000 cells were recovered of the 75,000 cells originally present. Approximately, then, 50 per cent plus were recoverable by centrifugation at 1,500 revolutions per minute for five minutes. This may be expressed in formula as follows:

$$\frac{\text{Number of red cells per c.mm.} \times \text{millimetres of sediment} \times 2}{\text{Number of c.c. of urine used}}$$

For example, 15 c.c. of urine placed in a 15 c.c. graduated centrifuge tube yielded 0.1 c.c. of sediment with 400 red cells per cubic millimetre. The estimation would be as follows:

$$\frac{400 \times 100 \times 2}{15} \text{ or } 5,333 \text{ red cells per cubic centimetre of urine.}$$

The labour entailed in counting the red cells in urinary sediments restricts its usefulness in clinical work. We have found the following procedure useful:

(1) Orthotolidine 1 per cent in chemically pure methyl alcohol. (It dissolves with slight difficulty and keeps at least ten months.)

(2) Glacial acetic acid one part and commercial hydrogen peroxide two parts. (This keeps for three or four months, probably longer.)

(3) Fifteen c.c. of urine is centrifuged at about 1,500 revolutions per minute for five minutes. The supernatant fluid is poured off. A portion of the sediment is prepared for microscopic examination in the usual way. To the remaining sediment two drops of the orthotolidine solution is added plus two or three drops of the acid-peroxide solution. In the presence of blood cells aggregating 100 per cubic millimetre of sediment (approximately 1,350 per cubic centimetre of urine) a greenish blue colour develops, lasting about one minute. In the presence of from 300 to 500 red cells per cubic millimetre of sediment (approximately

4,000 to 6,500 cells per cubic centimetre of urine) a deeper blue colour develops lasting about one minute. In the presence of larger numbers of red cells, aggregating 1,000 per cubic millimetre of sediment (approximately 13,000 per cubic centimetre of urine) as in hæmorrhagic Bright's disease (glomerulonephritis) a deep blue colour develops lasting two minutes or longer.

Undiluted blood serum, 10 per cent sodium hydroxide, strong trisodium phosphate solutions and probably other strong alkalis will give positive reactions. Pus cells or any of the common organic or inorganic constituents found in the urine do not give positive reactions.

CONCLUSIONS

(1) A 1 per cent solution of orthotolidine in chemically pure methyl alcohol and a mixture of one part of glacial acetic acid and two parts of commercial hydrogen peroxide are useful for an approximate quantitative determination of the number of red blood cells in the urine. These solutions are cheap and stable.

(2) In a relatively large series of examinations of specimens of urine examined within six hours after voiding, no positive reaction has been obtained except when microscopic blood was present.

(3) Specimens of urine containing as high as 5,000 red cells per cubic centimetre will in most instances be undetected by the usual microscopic examinations, since such numbers may represent only one or two cells per high power field.

Present Position of Agglutination Tests in the Diagnosis of Enteric Infections

By W. D. O'KELLY

(From the *Irish Journal of Medical Science*, April 1934, p. 145)

TWENTY to thirty years ago the diagnosis of typhoid fever in the laboratory was usually made by the microscopic procedure known as the Widal reaction. Like most tests, it was not perfect. It was often negative in early cases, and sometimes did not become positive in cases clinically typhoid. Moreover, the test involved the risk of infection, for living cultures were used. A satisfactory strain of typhoid bacilli was not always in stock, or, if it were, a fresh culture might not be immediately available at times when enteric fever was not prevalent. Furthermore, if the exclusion or verification of paratyphoid infection was also desired the test was time-consuming, especially when a number of sera had to be tested. Still, the test on the whole behaved satisfactorily in view of the amount of diagnostic work required a quarter of a century ago. It had also the advantage that it could be carried out on the very small amounts of blood withdrawn for tests at that time.

It was known, of course, that killed cultures could be used for the microscopic test, and that even the microscope could be dispensed with if one were prepared to await the result of the macroscopic test. As far as I know killed cultures were seldom if ever used here, but they were on the Continent (Ficker's diagnostic) and in the U. S. A. Then came the European War with, eventually, millions of troops in the field, troops recruited from anywhere and everywhere by people who thought less of the flora and fauna they carried than of their ability to carry a rifle. Enteric fever had always been a danger to soldiers in the field, sometimes more deadly than the bullet. It was obvious that the microscopic Widal reaction was not suitable for diagnosis in armies of such magnitude. Moreover, what appeared a suitable position for a bacteriological laboratory to-day might

be twenty miles or more behind the enemy's lines to-morrow. There was a further complication. The soldiers of the British Army brought with them new weapons of defence, namely, typhoid and paratyphoid antibodies, including agglutinins. This new defensive mechanism achieved one of the greatest triumphs of preventive medicine by reducing enteric fever to the level of a minor cause of invalidity and mortality amongst troops on active service. This achievement was mainly due to the unceasing efforts of that distinguished Irishman, Sir Almroth Wright. But it did not simplify the Widal reaction.

Fortunately Dreyer and Walker had improved the technique of carrying out the macroscopic reaction with killed cultures of typhoid, paratyphoid and other bacteria. The method evolved is now usually known as the Oxford method. Briefly, it consisted of the use of standardized pipettes, tubes and racks, the introduction of the drop-method of dilution, and killed cultures of standard density, agglutination being allowed to take place in a water-bath at 55°C. By this method large numbers of sera could be tested without the delay necessitated by sending samples to a regular bacteriological laboratory. Also it was possible, though not always easy, to differentiate between the sera of inoculated persons and those of enteric cases. Furthermore, Delépine had noticed that the sera of typhoid cases agglutinated not merely *B. typhosus* but also a strain of *B. enteritidis*, no. 7160, whereas the sera of inoculated persons only agglutinated the former. In 1916 Professor T. T. O'Farrell reported to this Section of the Academy on a series of sera in which he had investigated this matter, his results bearing out Delépine's findings. The explanation of this phenomenon will appear later.

With the coming of peace much research was done on the nature of agglutinins produced by infection with members of the enteric and Salmonella groups, it being recognized that whilst the technique of the agglutination test had been simplified, and it had become possible to compare the results of different workers more easily, the interpretation of the results so obtained still left much to be desired. As a result of this post-war investigation certain facts were brought to light. The work of Felix, Arkwright, Burnet and others gave a new significance to certain observations made by Dreyer and Jex Blake, Joos, and Smith and Reagh that there were two types of agglutinins reacting with two corresponding agglutinogens, each antibody agglutinating specifically with its own antigen. Moreover, one antigen was associated with the flagella the other with the body of the bacillus. The flagellar antigens and antibodies were designated by the letter 'H', the somatic antigens and antibodies by the letter 'O'. It is obvious, therefore, that a non-motile bacillus does not possess 'H' antigens and its antiserum cannot contain H antibodies.

Certain details, not essential for the purpose of this paper, may be omitted, but it is necessary to point out that 'H' and 'O' agglutinins differ markedly in some respects. Thus the flocculi resulting from 'H' agglutination are loose and relatively bulky, those from 'O' agglutination finer and more granular suggesting the differences between large, soft snow-flakes and the finer particles of frozen snow. Also 'H' agglutination appears and reaches its maximum more rapidly than does the 'O' variety, and whilst the former may appear at room temperature, the latter requires a much higher temperature for its demonstration. Were these the only differences all would be well, but the real question is the relative importance of the two types. Some would have it that 'H' and 'O' antibodies are of equal value as regards immunity, others aver that the 'O' antibody is the important one and would discard the 'H' antibodies as valueless for diagnostic purposes, as well as for prevention and cure.

Undoubtedly cases of clinically typhoid fever occur, from which *B. typhosus* has been recovered and in the sera of which 'O' antibodies fail to show up in the agglutination test. Similarly, cases are met with in which only 'O' agglutinins make their appearance. Still, in the majority of cases both varieties of agglutinins appear at some stage of the disease, sometimes the 'H' and at other times the 'O' variety being the earlier.

Another important observation was made by Schütze, namely, that by the use of the double or 'mirror' absorption test differences could be brought out between certain Salmonella organisms which might not show up if a single absorption test were made. Then Bruce White studied a series of organisms isolated from cases of food-poisoning with special reference to their antigenic structure, and found how these organisms resembled and differed from one another. The following table embodies his more important findings:

Table of antigenic relationship
(After Bruce White)

Name of organism	'O' or somatic antigen factors	'H' or FLAGELLAR ANTIGEN FACTORS	
		Type	Group
Paratyphosus B.	I, II, 7, 8	— (type)	G. A.
Stanley ..	I, II, 7, 8	S (type)	G. A.
Aertrycke ..	I, II, 7, 8	— (type)	G, A, B, C.
Reading ..	II, 8	D ₁ , D ₂ (type).	G, E ₁ , E ₂ .
Derby ..	II, 7, 8	Q. R.	None.
Enteritidis ..	III, 8	P. R.	None.
Typhosus ..	III, 8(x)	S.	None.
Newport ..	IV, VI, 7	D ₁ , D ₂ (type).	G, A, B, C.
Snipestifer (diphase).	V, VI	W, w ₁ (type).	G, B, E ₁ , E ₂
Snipestifer (monophase).	V, VI	None	G, B, E ₁ , E ₂
Hirschfeld ..	V, VI	W, w ₂ (type).	G, E ₁ , E ₂ .
Sendai ..	XI	T (type)	G, E ₁ .
Paratyphosus A.	XI	T	

The 'O' antigens are on the left, the Roman numerals representing major, the Arabic minor agglutinins or antigens. The 'H' antigens are denoted by letters. A bacillus possessing one of these antigens will, on injection or infection, give rise to the corresponding antibody. Now, take *B. typhosus*. This organism contains 'O' antigens III and 8, and 'H' antigen S. In the blood of a typhoid patient 'O' agglutinins III and 8 and 'H' agglutinin S will develop. If we test with a culture possessing only the 'H' antigen we get the floccular type of agglutination.

Now this result will also happen with a Stanley infection because the antigenic component S also occurs in this organism. If we carry out the test with a culture possessing only the 'O' antigen we get granular agglutination due to the components III and S. We should also get this result in an infection with *B. enteritidis* into the antigenic structure of which the factors III and S enter. But neither a Stanley nor a Gaertner serum would give both coarse and fine agglutination with appropriate typhoid cultures. Another point which emerges from consideration of this table is that to demonstrate the presence of typhoid 'H' agglutinins it is not necessary to use a culture of *B. typhosus*; a Stanley culture will work equally well. If we wish to demonstrate typhoid 'O' agglutinins an enteritidis culture will suffice.

Studying the table further we notice that the 'H' antigens are subdivided into two varieties, namely 'type' and 'group'. This differentiation results from the work of Andrews who studied the antigenic behaviour of individual colonies developing on a plate sown with a pure culture of a *Salmonella* organism. He found that for certain members of this group two varieties of colony grew. One showed wide relationship with other members of the group, the other disclosed very specific agglutinating properties. The former variety of colony, he said, consisted of organisms in the 'group phase', the latter of organisms in the 'type phase'. Organisms in which this phenomenon could be demonstrated were referred to as 'diphasic', and those which did not behave so as 'monophasic'. The American and European strains of *B. supeistifer* are examples of diphasic and monophasic organisms respectively.

Thanks to Gardner, strains possessing these various antigenic components are now prepared at Oxford, and it is possible to test a serum with a series of these cultures, and by a process of elimination ascertain what agglutinins it possesses. It is then usually possible to determine what is the infecting organism. Similarly mono-specific sera are available to enable us to ascertain the antigenic structure and, therefore, the identity of an organism isolated from the blood or excreta of a patient.

In practice a complete analysis of a suspected typhoid serum is not required, but in difficult cases only the closest co-operation between the clinician and the laboratory will enable a proper diagnosis to be made.

The straight typhoid case gives 'H' and 'O' agglutinins and for all practical purposes this denotes the existence of typhoid fever, past or present. When only 'H' agglutination is given either typhoid or Stanley infection (again past or present) is denoted. The clinician can differentiate between the symptoms of enteric fever and food-poisoning. If only the 'O' agglutination appears a Gaertner infection has to be excluded.

The particulars of the agglutination tests made on a recent case of paratyphoid fever will make the method of analysis clear.

Bacterial suspension used	Result	Factors detected (see table)
Typhosus 'H' ..	Negative (1-25)	—
Paratyphosus A 'H'.	Negative (1-50)	—
Paratyphosus B 'H' type.	Positive (1-5,000).	Para B. type.
Typhosus 'O' ..	Positive (1-250)	8
Paratyphosus B 'O'.	Positive (1-1,000).	I, II, 7, 8.
Salmonella 'H' to test for factor G.	Negative (1-50)	—

The case is clearly one of infection with *B. paratyphosus*, B in the 'type phase', showing some 'O' agglutination of *B. typhosus* owing to the common factor, S.

The inoculated case presents certain difficulties. According to some observers T. A. B. inoculation results in the production of 'H' agglutinins mainly, the 'O' agglutinin never reaching a high titre, and quickly falling, whereas in a genuine case the 'O' agglutinin rises higher and persists. In the first place typhoid in the inoculated is uncommon and, secondly, the serum, if from a recently injected person, will show paratyphoid A and B agglutinins. It may, however, be necessary to isolate the causal organism from the blood or excreta in such a case. In persons not recently inoculated a repetition of the test will show a rising titre with the development of 'O' agglutinins. Let me now recall to your minds the Delépine test. Inoculated cases did not react with strain no. 7160. Typhoid cases did. The explanation is that in the latter the 'O' agglutinin reached a demonstrable or significant titre whereas it did not in the former. A glance at the table will show at once the explanation—the 'O' antigen III is common to the typhoid and enteritidis bacilli.

The greatest difficulty presented in diagnostic work in our experience is the case in which the agglutinin titre is low and remains low. Such cases may be mild typhoid, perhaps ambulatory. Their recognition is of the utmost importance in preventing the spread of the disease. In these cases the isolation of the organism from the blood or stools would appear to offer the only satisfactory solution.

Intraocular Foreign Bodies With a Review of Eighty Cases

By DON MARSHALL, M.D.

(Abstracted from the *American Journal of Ophthalmology*, May 1934, p. 416)

THE treatment and prognosis of cases of intraocular retention of a foreign body have long puzzled the ophthalmologist. Despite the development of the ophthalmoscope, magnet, and x-ray, the profession still agrees that the prognosis is serious. As to the proper management of these cases, opinions differ. The oculist has good precedent for removing the foreign body at once, and for leaving it *in situ*; for removing it by the anterior root, or through the sclera; for employing the management as a diagnostic aid, or for carefully avoiding such possible trauma; for waiting for x-ray localization, or for hurrying to the operating room without this information. This article attempts briefly to consider these problems and, as illustration, to present in summary an analysis of 76 patients, or eighty eyes, examined at the University Hospital between 1925 and 1933.

DIAGNOSIS

The importance of prompt and accurate diagnosis is not questioned and has been often emphasized. Nevertheless, poor histories, incomplete routine examinations, and failure to use the x-ray cause many foreign bodies to be overlooked. This is malpractice, and failure to use the x-ray is in many cases negligence, both in the eyes of the law and in the opinion of established ophthalmic practice. Thorough objective examination, together with x-ray (which, however, is not infallible), will usually establish a diagnosis. In the past, before the discovery of x-ray, much faith was placed in the siderscope. Another procedure that still has many proponents is the production of pain with the magnet, as a diagnostic test. During the war, when x-ray facilities were limited, this was a routine

procedure at many stations, and even in civil life it has a place. Derby, claiming that we over emphasize the x-ray, declared that the magnet is the one indispensable test for the presence of an intraocular foreign body. Fuchs gives no warning against the diagnostic use of the magnet. But an opposite view is held by others, who feel that because of its unreliability and the trauma to the eye attendant upon each movement of the foreign body, the magnet is distinctly contraindicated as a means of diagnosis.

TIME OF EXTRACTION

Before the use of the magnet and x-ray, most eyes containing foreign bodies were promptly enucleated. More recently, this haste has been directed toward an early removal of the foreign body. These conditions have been considered to be surgical emergencies, which in the case of fresh injuries could not await an x-ray report. The vast amount of clinical experience and statistical evidence to show that the earlier the foreign body is removed the better the end result, justifies the majority opinion that speed is essential to success, that the foreign body must be extracted at almost any cost.

But there is to-day a growing belief that we should act less precipitately. Fuchs, after a lifetime of experience, advises that we must remove the foreign body early, but must not be overhasty, the purpose being only to effect removal before scar tissue forms. Certainly, in view of the numberless cases on record of retained foreign bodies in quiet eyes, many of them with excellent vision, and in view of the generally poor results that have been obtained in the past, we are compelled to reconsider our management of these cases and are justified in trying new principles. Green pointed to war statistics to show that sympathetic ophthalmia is much less common than was previously supposed. Bulson, after reviewing many cases of long-standing intraocular foreign bodies, concluded that we 'should more often tend to leave the foreign body in position, and the eye under good observation'. He believed that the all-too-frequent loss of vision is due not to the foreign body but to degenerative changes that usually would ensue even though the foreign body were out. Kiehle, continuing this line of reasoning, thought that we exulted too much over the 'successful' removal of a foreign body, while we had really gained nothing for the patient in vision. These authors believe that the act of removal may do more harm than the foreign body itself; that the danger of sympathetic ophthalmia is as great after removal as before; that precipitous treatment is undesirable.

ROUTE OF EXTRACTION

Foreign bodies in the anterior chamber, iris, or lens are, of course, removed through a corneal incision, if not through the original wound opening. Extraction of foreign bodies resting in the vitreous or retina may be attempted by the anterior route, or posteriorly through a scleral incision. Here again opinions differ. There is another group which believes that the route of extraction should be determined by study of the many factors in each individual case, an eclectic path which has been followed in the series herein presented.

SUMMARY OF EIGHTY CASES

In the summary which follows of a study of eighty eyes with intraocular foreign bodies, many of the less important and more detailed figures are omitted for the sake of brevity.

Incidence.—In line with the usual industrial origin of this type of injury, all of the 76 patients but one were males. Forty-seven per cent of them were between 20 and 40 years old, while 17 per cent were under 10 or over 60. The right eye was injured in 55, the left eye in 40, and both eyes in 5 per cent of all cases.

Delay postaccident.—Since most of our patients come from a distance, often referred by their local

physician, they are admitted at varying intervals after their accident. Thirty-four per cent arrived within three days of the accident; 21.5 per cent between 3 and 20 days after; and 20.5 per cent later than one year. In this last group are five patients who appeared, an average of 15 years after the accident, the longest interval being 30 years. The enforced delay in treatment in this series constitutes an important difference from series reported by workers in industrial centres, where only hours need elapse before extraction. A majority, or 65 per cent, of the injuries occurred in the proximity of hammering, or of machinery striking against metal. Yet 12 per cent resulted from dynamite or cap explosions, many of the victims being children.

Pain and vision.—In the interval between the accident and admission, at least 30 per cent of the patients had at some time had more or less pain. Often the pain was a result of ocular reaction rather than of the injury itself. On admission, 73 per cent of the eyes had a vision without correction of 6/60 or worse, and 6 per cent had no vision. Ten per cent had a vision of 6/15 or better.

Findings.—Examination of the eyes at admission showed the following: the foreign body entered through the cornea in two-thirds of the cases, a fraction somewhat higher than in Allport's series. There was moderate iritis in 42 per cent, severe in 16 per cent of cases. Secondary glaucoma was present in 7.5 per cent. In 26 per cent there was complete, and in 40 per cent a partial cataract—all traumatic, of course. At least 20 per cent of the eyes had more or less vitreous opacities, and 5 per cent retinal tears. The uninjured eye showed irritation in 2.5 per cent of cases. In 10 per cent it was found, on further examination, that there were more than two foreign bodies in the eye.

Of the foreign bodies, 61 per cent were in the vitreous, 14 per cent in the lens, 10 per cent in retina or sclera, the remainder in the ciliary body, iris, or anterior chamber. In one case the foreign body penetrated the globe twice and came to rest in the orbit. Fifty per cent of the particles were less than 2 mm. in their greatest diameter, but 13 per cent ranged between 4 and 9 mm. Over 88 per cent were of metal.

Extraction.—Operation for extraction of the foreign body was performed on 70 per cent of the 80 eyes, and in this group the foreign body was successfully removed in 70 per cent of the cases. In 30 per cent (17 cases) of this group, attempts to remove the foreign body were unsuccessful. In many of these 'failures', the attempted removal took place weeks or months after the injury; in some the foreign body was expected and found to be non-metallic; in some, extraction by the posterior route was not attempted, although by the anterior route it had failed. In these extractions the attitude of the surgeon was not always favourable to removing the foreign body at almost any cost. Doubtless more of the particles could have been removed by more strenuous efforts, and thus a greater number of 'successful' extractions listed. Seventy-nine per cent of the extracted foreign bodies were removed by the anterior, and 14 per cent by the posterior route. Seven per cent were removed through the original wound. Eighty per cent of the operations for extraction were undertaken within 60 days after the accident, and 43 per cent within 9 days; but only 20 per cent within 3 days. All of Walker's 350 cases were operated upon within 2 to 8 hours after the injury.

Postoperatively, two cases developed definite retinal detachment. Both were cases in which the foreign body was extracted by the posterior route. Little can be deduced from two lone cases.

Enucleations.—Of the 80 eyes in this series, 68 per cent were saved; 8 per cent were examined but for various reasons not treated; 21 per cent were enucleated at varying intervals after the accident; and in 2.4 per cent enucleation was advised but not performed by us.

A saved eye is cosmetically often better than a prosthesis. On the other hand, in this type of case, it is often a constant source of danger to the other eye. In two cases there was irritation of the uninjured eye on admission; in two more it developed later. Thus sympathetic ophthalmia has a higher incidence in this series than in others reported.

The question of enucleation again gives the surgeon a difficult problem to solve. Allport says that if neither vision nor appearance can be saved, enucleate. Walker urges against postponement of enucleation in cases of retained foreign body or of injury to the ciliary body unless the eye can be kept under observation. Nevertheless, McReynolds claims that it is perfectly safe not to disturb a foreign body that is giving rise to no inflammatory reaction. An eye should, of course, be removed at once if it is evidently ruined, or if it is useless and inflamed. But Sherman and Fuchs advise waiting a week or more before so doing in a badly injured eye, because it may improve surprisingly.

The seventeen enucleations in this series were done in four cases for infection and panophthalmitis; in four cases for sympathetic ophthalmia; in five cases because of violent uveitis; in two cases because the eye was blind and painful; in one case for secondary glaucoma with a useless eye; and in one case because of extensive vitreous hæmorrhage with detached retina.

Hospitalization.—Our patients in most instances came from afar, and could not return to localities or industries where they could be carefully followed and given special treatment. Of necessity, therefore, they were hospitalized longer than industrial patients living in the same city would be. There was no hospitalization for treatment in 5.3 per cent of the cases; and 6.5 per cent were only examined, with treatment not indicated, or refused. In 78.6 per cent of cases hospitalization was given for a total of 4 to 40 days; in 44 per cent hospitalization was for a total of over 20 days; and in 5.3 per cent for a total of 70 to 90 days. Moore, incidentally, advises hospitalization in all cases for removal of the foreign body.

Visual results.—Final vision, after all, is about the most important criterion of results. The main function of the eye is vision; if that is saved little else counts. But in a series of this type final vision is difficult to determine because time is such a vital element, and the longer the interval between accident and observation, the more likely it is that the sight has been lost. The fact that loss of vision results usually from degenerative changes that take place whether the foreign body is in the eye or out, renders it patent that the significance of visual results increases in proportion to the interval that has elapsed since the time of injury and treatment. Kiehle emphasizes the point that available statistics are woefully deficient in observations of visual acuity over long periods of time. Such a long time observation of a series of patients is difficult for any ophthalmologist, whether in private practice or in institutional work. Proof of the benefit of extraction of foreign bodies, and of the safety of leaving them in, depends, of course, on series of patients observed for several years.

In this series replies were received from 30 of the 51 whom we asked about the present status of their eyes. Results, therefore, are as recent as possible. Final vision, so far as is known, of the 80 eyes is:

Results

18.3 per cent have 6/15 or better.

3.7 " say that they can read with the eye.

6.2 " say that they can get around with the eye.

39.8 " have 6/60 or worse.

21.2 " are enucleated.

10 " are unknown.

Useful vision has, then, been attained in a fifth of the cases. Certainly vision in many of the other cases could be improved with refraction and surgical treatment of cataracts.

ANALYSIS

Seeking, in this series, answers to the conflicting questions and opinions on the management of intraocular foreign bodies, we still cannot reach a definite conclusion. There are 8 cases of vision of 6/15 or better with the foreign body in the eye—in 6 of these that vision has been maintained for over one year since the accident, and in 4 of them more than six years. But there are 11 cases of good vision with the foreign body out. To support the method of watchful waiting, we find 15 cases of foreign body in the eye without resultant irritation, 12 of these cases over one year later, and seven over five years later. Yet there are 11 cases of a foreign body remaining in the eye in which irritation *did* develop (although the irritation might have occurred anyway, following extraction). There are 20 cases of foreign body remaining in the eye with poor vision, in contrast to 16 cases of *extraction* of the foreign body with poor visual result. There are 7 cases in which the foreign body was removed and the eye remained *irritable*, but 25 in which it remained *quiet*. To support the contention that immediate results are misleading, that vision should be followed for some time, we find three cases with excellent vision after extraction of the metal, which later became blind from complications. On the other hand, there are 7 cases of long-standing good vision, 5 of them six or more years after the accident. Against the command that we extract the foreign body at once, we find 8 cases of good surgical result, and in most cases good visual result, in which the foreign body was removed from 8 days to 1½ years after the accident, and there are 12 cases in which the foreign body has been in the eye an average of 12 years each, in most of them with no irritation whatsoever.

A study of this series reveals, through the variation in its results, the reason for such diversity of opinion as exists. And, too, it shows why the majority have believed as they have in removing the foreign body, and that rather promptly. For, on the whole, the instances among these 80 eyes, in which the foreign body was removed without overlong delay, were attended with better results in the end, as a group. Yet the great number and variety of exceptions to this rule prove that we have not yet mastered the problem, and that very likely we should modify our principles of management toward less haste, less extraction, and more observation. On one point all statistics agree—the prognosis is in most cases poor; brilliant results are in the minority.

SUMMARY AND CONCLUSIONS

(1) A review is presented of the varying opinions with regard to the proper management of intraocular foreign bodies.

(2) A brief analytical summary is made of 80 cases of intraocular foreign bodies.

(3) Study of the literature, and of a series of cases, supports the contention that ophthalmologists should consider more carefully the disadvantages of hasty extraction of foreign bodies, and should, by more observation and less meddling, avoid strenuous and damaging efforts to extract every foreign body.

(4) The prognosis of a case of intraocular retention of a foreign body is generally poor, and in the individual case cannot be foretold.

Reviews

GREEN'S MANUAL OF PATHOLOGY.—Fifteenth Edition. Revised by H. W. C. Vinos, M.A., M.D. 1934. Baillière, Tindall and Cox, London. Pp. xii plus 928 with 8 coloured plates and 425 figures. Price, 25s.

Green's Pathology has for many years been one of the most popular of students' handbooks on this subject. It gives the student just the amount of information that he requires for understanding the diseases he encounters clinically, and for satisfying his examiners. The present edition is very largely rewritten, but the balance has not been upset. The actual bulk of the book is greater, but this increase is due mainly to the inclusion of a number of new illustrations and not to any great extent to an increase in the length of the text; we say 'to any great extent' because if recent advances in our knowledge are to be included some expansion is essential, e.g., avitaminosis and the diseases of the ductless glands are subjects about which little was known a few years ago, but which have now assumed positions of considerable importance. Other chapters have been added to cover recent additions to our knowledge in regional pathology.

The illustrations are all good, the majority are photographs, some in colour, but, where diagrammatic treatment has been considered essential to demonstrate structure, the drawings have been retained. However, we are told in the preface that one hundred of the latter have been reproduced by photographs; it is a great tribute to modern museum technique, photography and reproduction—and to the editor and publishers of this book in particular—that this has been effected without sacrifice to clarity.

Like many books of its kind it still exhibits curious little embryonic rests in the form of chapters on parasitology—perhaps the editor is bowing to the dictates of the medical curriculum.

We deny that the book is unsuitable for the post-graduate student and research worker, as the editor suggests in his preface; the specialism of the specialist is necessarily limited and in subjects of which he has made no special study, we will often find the concise account given in this book far more helpful than the complete, but confusing, exposition of a monograph. This is primarily a student's book, and an excellent one, but there are few medical men who will not find it of very great value.

AN INTRODUCTION TO PRACTICAL BACTERIOLOGY.—By T. J. Mackle, M.D., D.P.H., and J. E. McCartney, M.D., D.Sc. Fourth Edition. 1934. E. and S. Livingstone, Edinburgh. Pp. viii plus 504. Illustrated. Obtainable from Messrs. Butterworth and Company (India), Limited, Calcutta. Price, Rs. 9-6

THE considerable amount of revision which has been performed has made this extremely useful and popular book even more valuable than its previous edition. Much new material has been added and the subject-matter has been arranged into three parts to help the student in using the book. The part dealing with bacteriological and serological technique is particularly good, and with the judicious use of small print a vast amount of useful information has been collected within the scope of this book which retains the convenient size of the previous editions. The new technique, originally described by one of the authors, for the storage and distribution of culture media involving the substitution of screw-capped test-tubes, has been fully described. The only criticism that we have to offer, and it is a criticism that applies to many of the textbooks of bacteriology, is that, although recognizing that

the classification and nomenclature of bacteria introduced by the Society of American Bacteriologists is the only one that follows strictly the accepted rules of biological classification, the authors have not thought fit to adopt that classification. The new classification is outlined and the important genera named, but the examples given are still named in the old unscientific way. It is a pity, as the sooner the only systematized nomenclature is followed in textbooks the better for the student and the teacher. In all other respects this is an excellent book and will prove of great value for the student of bacteriology.

C. L. P.

BRUCE AND DILLING'S MATERIA MEDICA AND THERAPEUTICS. An Introduction to the Rational Treatment of Disease. Fourteenth edition, revised. By Prof. Walter J. Dilling, M.B., Ch.B. (Aberd.). 1933. Publishers: Cassell and Company, Limited, London. Pp. x plus 700. Price, 16s. 6d.

THE new and revised edition of *Materia Medica and Therapeutics* promises to be a useful book for the medical students, for in it they will find a fairly complete and satisfactory account of the pharmacological action and the relative therapeutic values of the various drugs used.

This well-known and admirable book needs no introduction. The first edition was published in 1884 and the fact that so many subsequent editions were called for in recent years is a sufficient indication of its continued popularity and usefulness.

On the basis of the British Pharmacopœia, 1932, the entire text has been subject to most careful revision and the present edition is brought up to date. In accordance with the modern views, most of the redundant and less useful materials have been discarded. Remedies not yet officially accepted have been included and such substances as thallium, sanocrysin, uroselectan, atebirin, etc., and various dyes used for diagnostic purposes have received appropriate attention. In addition, there are useful notes on radiation, massage, and an outline of invalid diets, etc. Altogether, the book must be considered a most useful volume for the general reader, largely because of the simplicity and directness of the presentation and also because it is written so definitely with the needs of the students and practitioners in mind.

R. N. C.

OBSTETRIC MEDICINE: THE DIAGNOSTIC AND MANAGEMENT OF THE COMMONER DISEASES IN RELATION TO PREGNANCY.—Edited by F. L. Adair, M.A., M.D., F.A.C.S., and E. J. Stieglitz, M.S., M.D., F.A.C.P. 1934. Henry Kimpton, London. Pp. xvi plus 743. Illustrated. Price, 36s.

PRACTITIONERS are continually faced with the problem of the pregnant woman suffering from intercurrent diseases and their difficulty is to know when to, and when not to, terminate pregnancy. Textbooks on obstetrics usually give scanty information on this subject and are of very little help.

The editors have set out to co-ordinate and correlate the medical knowledge concerning the problems of diagnosis, therapy and prognosis of disease occurring coincidentally with pregnancy. They have edited the contributions of thirty-nine contributors—each one an eminent authority and have produced a textbook of medicine written from the point of view of the pregnant mother.

The book is divided into sections dealing with the various systems. Each section is subdivided into chapters—each of which is written by one or two specialists.

Contributors have kept in view that pregnancy may have an effect on disease and that disease may have an effect on pregnancy. So far as is possible an attempt has been made in each chapter to give definite indications as to when pregnancy should be terminated. For this alone the editors deserve every commendation.

Each contributor gives current views on his subject plus those based on his own experience. References are profuse and at the end of each chapter is given a bibliography. The chapter on specific infectious diseases containing twenty-seven pages contains no less than two hundred and three references.

The editors are to be congratulated on producing a textbook which is the first of its kind and is of great value to both the specialist and practitioner of obstetrics.

S. N. H.

A HANDBOOK OF LABORATORY TECHNIQUE.

Part I. (Urino).—By D. Govinda Reddy, M.D. 1934. The Antiseptic Press, G. T., Madras. Pp. 120. Illustrated. Price, Rs. 1-4. Available from the Manager, The 'Antiseptic', Thambu Chetty Street, G. T., Madras

This small book is intended for the use of medical students and young practitioners as a handy laboratory guide.

There are a few points in the book, however, on which the author might have been more explicit. As for example, when describing the method of estimation by Aufrecht albuminometer he advises centrifugalizing 'for not less than five minutes' without giving any idea of the number of revolutions per minute. The result, obviously, will vary according to the revolutions which the machine is put to as well as the time limit.

Taken, on the whole, the book has been written in a clear and simple style and will be a help to those for whom it is intended.

J. P. B.

DIABETES: REASONS AND RECIPES.—By E. E.

Claxton, M.B., B.S. (Lond.), D.T.M. & H., and Lucy Burdekin. 1933. John Lane The Bodley Head Limited, London. Pp. xvi plus 188. Illustrated. Price, 5s.

DR. CLAXTON'S book forms one among the many books which are coming in quick succession at the present day for the benefit of the diabetic patients, intended not only to help them in the proper understanding of the disease they are suffering from but also to enable them to vary their diet for themselves without constant reference to their doctors and thus break the monotony of having to take the same meal day after day.

The authors do not claim any originality in the subject-matter but the main object of the book according to them is to enable the diabetics to have varieties in their diet. In this the authors have been successful because the numerous recipes and cooking hints included in the book are likely to satisfy even the most fastidious subject. The chapter on the composition and the choice of diet has been very clearly and lucidly written and should enable the majority of patients to make the correct use of the recipes without altering the food values of the diet.

J. P. B.

URINARY ANALYSIS AND DIAGNOSIS BY MICROSCOPICAL AND CHEMICAL EXAMINATION.—By L. Heltzmann, M.D. 1934. Sixth revised edition. Baillière, Tindall and Cox, London. Pp. xix plus 385 with 131 illustrations. Price, 22s. 6d.

We had the pleasure of reviewing the previous edition of the book about five years ago. The present

revised edition is somewhat larger and a new short chapter on the hormone test of pregnancy is a welcome addition, in view of the recent important work started by Aschheim and Zondek in 1928 and followed later on by other workers such as Friedman and Cosgrove.

The chemical tests described in the book are not only reliable but fairly simple so that most of them could be performed without the necessity of a completely equipped chemical laboratory.

As in previous editions the author has laid great stress upon the microscopical examination of the urine and has emphasized the importance of recognizing the various forms of epithelial cells found in the different regions of the genito-urinary tract. On this point we are in complete agreement with the author because in many of the pathological conditions of the genito-urinary tract, where the chemical symptoms are rather vague, the microscopical examination of the urine, aided by the chemical tests, often helps us in arriving at a correct diagnosis regarding the probable place of the lesion.

We have no hesitation in saying that this book should be classed as one of the standard books of reference on urinary analysis and diagnosis.

J. P. B.

CHOLERA: A MANUAL FOR THE MEDICAL

PROFESSION IN CHINA.—By W. Lien-Teh, J. W. H. Chun, R. Pollitzer and C. Y. Wu. 1934. National Quarantine Service, Shanghai, China. Pp. xxii plus 198 with one colour and 23 half-tone plates. Price, 12s.

This monograph on cholera is one of the best that we have read. It deals with the subject in a practical manner and surveys the cholera problem in a very comprehensive way. Although the book is intended primarily for use in China and the problem as it affects that country has been given more detailed attention, it is a book that will prove of value to those interested in cholera in all parts of the world. It is of particular value to India and of special interest to Bengal. As the authors say in the preface it is at once something less than a treatise and something more than a popular book. It is in fact a handbook on cholera for the use of rational practitioners of medicine. In the introduction the authors state 'the problem of cholera is a live one in China to-day. It is startlingly modern in its impact on the everyday existence of a quarter of the human race. The cholera situation, in short, is due for a final clean-up. Experience has proved that the disease can be made to disappear from a district, a country or a continent. India and China are still hot-beds of infection'. If the problem of cholera is a live one in China to-day it is even more so in this country and the cholera situation is most certainly due for a final clean-up. This book does not attempt to solve the basic measures required to stamp out this dread scourge, but it provides some sort of foundation for a concentrated movement by central, provincial, district, municipal and local authorities to eradicate cholera. The book is divided into four parts, each part written by one of the authors but the whole represents the views of all the writers. Part one deals with the historical, geographical and epidemiological aspects, parts two and three with the laboratory and clinical aspects, and part four with education and propaganda, with an appendix dealing with the spread and control of sea-borne cholera. Each part contains a most excellent summary of important points and a critical survey of the latest work in cholera. There is much in the first three parts that will be of interest to workers in cholera and much that is new in the history of cholera which the authors have extracted from old Chinese works. It is, however, the last part on education and propaganda which is a unique feature of this book. The whole subject of the

education and the development of the conscience of the people is discussed in an exhaustive manner and this part of the book is of particular interest to India. Propaganda, legislative measures are discussed and the planning of an anti-cholera campaign outlined. The necessity for a central organization, including not only government and municipal health officers but also representatives of public bodies and individuals whose advice may prove useful, as well as for the co-operation of the press, is stressed. This part is illustrated by photographs of posters, handbills and pamphlets used for propaganda work, and shows how well these have been designed. Two of the posters used in India have been included in this series. We would particularly draw attention to this part of the book and for this part alone it should be in the hands of all those who are concerned in combating this scourge of mankind, whose 'home' for centuries has been in India and Bengal in particular. We cannot recommend this book too strongly. It is also a valuable summary of the excellent work that has been done and is in progress in China. This is the first of a collection of practical manuals on the commoner epidemic diseases occurring in China that the National Quarantine Service intends to issue. If they are of the type of this forerunner of this series they will be of real service to both science and man, and we look forward to them.

C. L. P.

ALCOHOL AND ANÆSTHESIA.—By W. Burrldge, D.M., M.A. (Oxon.). 1934. Williams and Norgate Limited, London. Pp. 65. Price, 2s. 6d.

THE author of this brochure must be known to many in India for his views on the nature of nervous activity. In this book he has attempted to explain the action of alcohol and anæsthesia in terms of his theories. The chapter on chronic alcoholism contains some interesting ideas. He points out that there is something in the living organism which is always striving to attain and maintain normality. The chronic alcoholic is mentally below par and the effect of alcohol is to bring his outlook up to the standard. Herein lies its danger to such types. This book should prove of interest to those acquainted with Dr. Burrldge's views.

H. E. C. W.

THE CHEMISTRY OF THE HORMONES.—By B. Harrow, Ph.D., and C. P. Sherwin, D.Sc., M.D., Dr.P.H. 1934. Baillière, Tindall and Cox, London. Pp. vii plus 227. Price, 11s. 6d.

To keep abreast of the modern work on the endocrine secretions is to-day well-nigh impossible. The advances in this subject are so rapid that the average textbook is probably out of date on this topic within a year of publication. This book will enable one to call a halt and take a general survey of the field as it stands to-day. The subject-matter as the title indicates is the chemistry of the hormones. This aspect may not be of great interest to the medical practitioner, although the subject is dealt with clearly and with full references, nevertheless he will find here a considerable amount of information on the number, nature and functions of the hormones discovered up to date. The most recent additions to our knowledge come from discoveries connected with the anterior lobe of the pituitary, the ovary, and the cortex suprarenalis. The anterior lobe of the pituitary appears to contain some four or five different secretions, namely—stimulant to ovulation and spermatogenesis, growth stimulant, thyroid gland stimulant, adrenal stimulant and one controlling carbohydrate and fat metabolism. The ovary has been shown to produce a substance œstrin (theelol) which initiates changes in the vagina associated with œstrus, and progesterin (from the corpus

luteum) which acts on the endometrium and produces the changes necessary for the complete menstrual cycle. A preparation has been made from the cortex suprarenalis which appears to regulate the water and salt balance between the tissues and the blood. This secretion also affects the level of the non-protein nitrogen of the blood. In the limited space of a review it is impossible to discuss the important work which has been done notably on insulin in particular. There are however a number of interesting facts which give one food for thought, to mention one only, the similarity in chemical constitution between œstrin, carcinogenic substances and vitamin D. A discussion on the integration of these different hormones is not included; this may be excused, as at the present time it is best left to the imagination of the individual reader. One feels certain however that the healthy organism has some means for co-ordinating their activity so as to insure the constancy of what Claude Bernard called the *milieu interne* of the cells. The book is clearly written and should prove of interest both to biochemists and medical men.

H. E. C. W.

MASSAGE AND REMEDIAL EXERCISES IN MEDICAL AND SURGICAL CONDITIONS.—By N. M. Tidy. Second Edition. 1934. John Wright and Sons, Limited, Bristol. Pp. xii plus 430. Illustrated. Price, 15s.

THIS is an excellent book containing all that is necessary for a student in massage and remedial work. It enumerates all conditions requiring treatment by these means, describes pathology, symptoms, splinting (where necessary) and medical, surgical and physical treatment of each, and supplies notes on electrical and light treatments.

The illustrations and diagrams are particularly clear, while the excellent index considerably simplifies reference. The chapters on fractures are particularly good. The book can be strongly recommended, not only to students, but to the practising masseuse and medical gymnast requiring a book for reference.

P. B.

THE CONSTITUTION AND ITS REACTION IN HEALTH.—By T. E. Hammond, F.R.C.S. (Eng.). 1934. H. K. Lewis and Company, Limited, London. Pp. ix plus 160. Price, 7s. 6d.

It is only within recent years that the term constitution has ceased to be a rather vague definition and has been subjected to a certain amount of analysis. To-day two broad types have been marked off, namely, the hyposthenic and the hypersthenic, although it is seldom if ever that one sees a pure case of either. A complete list of the features associated with each type is not possible in a review; in general however the hyposthenic is of poor physique, lacks physical and mental energy, is introspective and has a tendency to chronic infections, while the hypersthenic is of good physique, is physically and mentally active, is extropective and has a tendency to acute infections which run their complete course. One chapter of the book is devoted to a discussion of those types while the remainder deals chiefly with health in relation to climate, occupation, leisure, etc. There is a considerable amount of common sense although some of it is rather commonplace as far as the medical man is concerned. The book should prove interesting reading however particularly to the intelligent layman.

H. E. C. W.

'LA LEPRE'.—By Ed. Jeanselme (G. Doin & Cie, Éditeurs, 8 Place de L'Odéon-Paris). Quarto with 680 pages, 259 black and white figures and 14 coloured plates. Price, 600 francs

WHILE there are numerous references from other writers the author has made no attempt to write an

exhaustive treatise. The researches of the French School are given in detail and much of the work of the United States and their colonies is quoted, as well as that of Japan and South America.

There are 15 chapters in the book. The first two deal with the definition and nomenclature of the disease. The third chapter, illustrated with curious old engravings, goes fully into the history of leprosy, while the fourth chapter gives a sketch of the geographical distribution. The following sections deal successively with bacteriology, serology, immunity, general pathology, anatomy and ætiology.

Much space is devoted to combined clinical and histological studies of various types of lesions. Chiefly advanced cases of leprosy have been studied, but a brief description is given of the so-called 'tuberculoid lesions' as described by Jadason and others. This section is of great value because of the thorough manner in which the literature is reviewed in the light of the writer's vast practical experience of the disease.

The chapter on prophylaxis deals very fully with the methods adopted in various countries; these are divided

under various groups. Treatment is dealt with very thoroughly and the following introductory paragraph is worth quoting in full. 'There is no specific for leprosy, but it is possible to obtain quiescence of symptoms, an arrest of the evolution of the morbid condition and, possibly, even a radical healing of the infection, by a number of therapeutic means, the combined use of which is essential. The following constitute the hygiene of leprosy: the treatment of concomitant diseases; medical treatment of the disease itself; symptomatic treatment; and the treatment of complications'.

One of the most valuable assets of this handsome volume is the fourteen colour plates at the end. The first four show various clinical types, while the remaining illustrations (four in each plate) give the microscopic appearances of lesions of the skin and internal organs.

While the price of this book may be beyond the purse of the ordinary practitioner, it should at least find its way into every medical library.

E. M.

Abstracts from Reports

A MEDICAL SURVEY OF ADEN, 1933. By LIEUT.-COLONEL F. SELBY PHIPSON D.S.O., M.D. (LOND.), M.R.C.P. (LOND.) D.P.H., D.T.M. & H., I.M.S. CIVIL ADMINISTRATIVE MEDICAL OFFICER, ADEN

HOSPITALS

Government:—Civil Hospital, Crater—principal diseases; medical work among women. European General Hospital, Steamer Point.

Private:—Keith Falconer Mission Hospital, Sheikh Othman.

THE CIVIL HOSPITAL, CRATER

The Civil Hospital, built in 1861-63, is situated in the Crater on rising ground forming a salient from the hillside into the south-west part of the town of Aden, from which it is easily accessible on three sides. It originally consisted of two wards only: since then other wards have been added and at present it comprises several buildings with accommodation for one hundred and twenty-eight cases, and when the maternity and tuberculosis wards which are now under construction are completed, the total accommodation will be for one hundred and fifty-two patients.

Certain disadvantages are inseparable from the nature of its surroundings—noise, flies and dust. Flies and dust are a nuisance throughout the town at certain times of the year, but the accessibility of the hospital to the general mass of the population of the town more than counterbalances these disadvantages.

In 1929 a committee was appointed by Sir Stewart Symes, then Resident and Commander-in-Chief, to enquire into and report on the proposal to remove the Civil Hospital from its present premises to the recently-abandoned British Infantry Barracks on the sea-front. The committee after careful enquiry decided not to recommend such a change, mainly for two reasons, that, apart from the Jewish element, the great majority of the local inhabitants, Arabs, Somalis, Hindus and Indian Mohammedans, were opposed to the change and that the advantages to be gained by the change of site would not be commensurate with the very heavy anticipated expenditure. Sir Stewart Symes, having accepted the recommendation of this

committee to leave the hospital in its present situation, appointed another committee to enquire and report what renovations, structural alterations and additions to the hospital premises were necessary to put the hospital in a position to supply the requirements of all classes of the non-European resident population in the Aden Settlement and of patients from the interior, and to improve the general standard of its accommodation. This committee suggested extensive improvements, consisting of fifteen items for new buildings and five involving repairs or minor alterations to existing buildings. The scheme was sanctioned in its entirety by the Government of India and most of the works proposed by the committee have since been carried out, and it is probable that next year will witness the completion of the whole scheme.

The hospital follows an 'open door' policy, admitting non-European patients whatever their religion or nationality, and no discrimination is made between British subjects and patients of alien nationality. The hospital is maintained entirely by grants received from the Indian Government and the Colonial Office, the income from paying-patients' fees being negligible, and the total annual recurring expenditure is on an average Rs. 50,000.

There is a special female ward with twenty beds served entirely by a female staff and so built as to suit, as far as is possible in a general hospital, the susceptibilities of orthodox Mohammedans. A special ward was built by the late Mr. Menahem Messa, a wealthy Jewish merchant of the town, solely for Jews; it has accommodation for six males and six females and was built in 1897 at the cost of Rs. 10,000, and all the patients admitted into the Jewish ward are dieted and clothed at the expense of Mr. Menahem Messa's heirs. For patients of the well-to-do classes there is a special block containing accommodation for seven patients, where each patient is given a separate room on payment of a nominal charge varying from Re. 1 to Rs. 5 per day, according to the means of the patient. This block occupies a very favoured position in the hospital grounds. There is also under the control of the institution a mental block with accommodation for six patients which will soon be increased to ten. Mental patients are detained here under observation and if certified insane they are either handed over to their relations,

if they are willing to hold themselves responsible for their care, or they are transferred to the mental hospital, Thana, Bombay Presidency, irrespective of their nationality or place of origin. The responsibility for these cases being only rarely assumed by relatives, Arabs and Jews have occasionally to be transferred to the mental hospital in India; this is hardly a satisfactory arrangement, but owing to the fact that the accommodation in the mental block is very limited the patients cannot remain there, and no alternative has yet been devised. Incidentally it may be mentioned that it costs about Rs. 800 to transfer a mental case from Aden to India.

NURSING ARRANGEMENTS

Previous to 1928, the female staff consisted of two ayahs only and the male staff used to attend to the female wards. The first nurse was appointed in 1928, and she was expected to look after the whole hospital in addition to attending midwifery cases in the town. In the year 1931 a fully trained nurse, Miss D. K. Morton, was appointed in addition as sister-in-charge and in the same year a third (probationer) nurse was also appointed, and the hospital thus has now a sister-in-charge, a nurse-midwife and a probationary nurse.

PRINCIPAL DISEASES

The principal diseases for which patients seek admission in the Civil Hospital are :

Malaria.—Most of the malaria patients are from the interior, and the commonest variety of malaria is malignant tertian.

Hepatic cirrhosis.—Patients are often admitted with enlargement and cirrhosis of the liver, enlargement of the spleen and ascites. These patients are mostly from the interior, where malaria and the habit of eating *qat* (*Catha edulis*), an indigenous plant extensively cultivated in the Yemen, and containing a stimulating and mildly intoxicating principle, are extremely prevalent. To what degree either of these factors is responsible for the condition, it is difficult to estimate, but the extent to which *qat* is consumed, sometimes by the more well-to-do in quantities to the value of five or six hundred rupees a month, suggests that its ultimate effect on the organism, by absorption of the toxic principle, may well be harmful. The extent to which *qat* is consumed in the interior where it is very cheap, may be judged from the fact that in Aden, where the cost is high, the octroi revenue from imported *qat* is, in a normal year, Rs. 70,000 per annum, the value of the *qat* itself being Rs. 4,00,000 or approximately £30,000. The writer is making arrangements for the investigation of this drug at the Calcutta School of Tropical Medicine through the courtesy of his colleague, Lieut.-Colonel R. N. Chopra, I.M.S., Professor of Pharmacology.

Pulmonary tuberculosis.—This disease is extremely common both among the local inhabitants and people from the interior. Debilitating climatic conditions, unhygienic surroundings, privation and other existing diseases are all important predisposing causes of the disease.

Veneral disease.—Gonorrhœa is by far the most common venereal disease. Unfortunately, patients seek treatment only when the disease is well established and discontinue it as soon as the obvious signs and symptoms have disappeared. Under the rules of the Aden Settlement, any prostitute who is declared or suspected to be suffering from a venereal disease is required to present herself for admission and remain in the Civil Hospital for treatment until she is certified to be clinically free from the disease.

Dysentery is fairly frequent, and mostly of the bacillary type. Amœbic dysentery is rarely met with in Aden.

The surgical conditions for which patients most commonly seek admission to this hospital are the following:

Vesical calculus is very common. Climatic conditions, hardness of water, infection of the urinary tract, and probably a diet deficient in accessory food substances are the principal predisposing factors.

Fractures form a special problem. The illiterate element of the population is very impatient of any form of restraint. Carefully applied splints are sometimes taken off within a few hours of their application, and in spite of repeated warnings, patients begin to walk before callus is firmly consolidated.

Inguinal hernia is a common condition met with amongst the Arabs and Jews of Aden.

Myxetoma is fairly commonly met with amongst patients seeking admission from the hinterland. Out of thirty-two cases seen during the last four and a half years, thirty were of the black variety and only two of the yellow variety.

Tropical ulcer is one of the most common of the disabling diseases treated in the Civil Hospital. It is met with principally amongst Arabs from the hinterland. Malaria, colitis, privation and tropical climatic conditions generally all tend to aggravate the condition. As commonly described, spirochaetes and fusiform bacilli are frequently found in the discharge from these ulcers, but the real causative agent is not known. The condition involves prolonged hospital treatment; it results in serious deformity and amputation has often to be resorted to in severe cases. **Cancer** is a rare disease among people seeking admission to the Civil Hospital, similarly *appendicitis*, *gastric* and *duodenal ulcers* and *tetanus* are rare conditions. Not one case of *tropical abscess of the liver* has been met with in this hospital for the last four and a half years.

MEDICAL WORK AMONG WOMEN

Medical work among women is a branch of medical activity which is making but little headway, but it presents great possibilities. At the present time progress seems to have been arrested and the difficulty of further advance is mainly on account of the immense barrier which intervenes between medical aid and the women who need it, owing to the existing traditions and customs of the Mohammedan community and to the want of suitable provision for the better class patients in the female section of the hospital by means of family wards composed of separate units.

VITAL STATISTICS

Population.—The total (civilian) population of the Aden Settlement according to the census of 1931 was 45,992, showing an increase of nearly 2,000 on the census figures of 1921. The figures exclude the military and the population of Perim. The following table shows the population distribution by sex, and class :

Number	Classes	Male	Female
1	Arabs	18,388	10,341
2	Indian Mohammedans	2,829	2,393
3	Somalis	2,070	2,107
4	Hindus	1,992	622
5	Jews	2,114	2,006
6	Parsis	236	96
7	Native Christians, Indian, Goan, Somali, etc.	239	207
8	Europeans ..	213	39
	Total ..	28,181	17,811
	GRAND TOTAL ..	45,992	

The local distribution of this population is as follows: Crater, 23,283; Sheikh Othman (including Hiswa, Imad

and Little Aden), 11,051; Maala, 3,849, and Tawahi (including Steamer Point), 7,809.

There is a marked disproportion between the numbers of males and females, particularly among Arabs, which is due to the fact that most of the coolie class, and many Arab traders come to Aden without their women-folk.

STATEMENT SHOWING THE PRINCIPAL CAUSES OF MORTALITY
IN THE SETTLEMENT OF ADEN

(Mean of the four years 1930 to 1933)

Serial number	Causes of death	Mean annual number of deaths
1	Diarrhoea, dysentery and gastro-enteritis.	276
2	Pneumonia	166
3	Phthisis	147
4	Premature and stillbirths ..	128
5	Respiratory diseases other than pneumonia and phthisis.	106
6	Unclassified fevers ..	77
7	Malaria	35
8	Septicemia and cellulitis ..	25
9	Enteric fever	20
10	Cardiac failure	18
11	Cirrhosis of the liver ..	15

Mean death rate for the period equals 29.01 per 1,000 of the population.

CONCLUSION: FUTURE DEVELOPMENTS

The recent developments of medical relief, of hygiene and of sanitation in the settlement of Aden have now reached a point beyond which further progress is very largely dependent on the education of public opinion. The more progressive and educated elements of the community are a very small minority in the great mass of the population, which is backward and intolerant of change of any sort. Even the educated and intelligent minority are not free from the trammels of custom and prejudice and it is thus inevitable that those developments of public health work which depend, as so many do depend, on the acquiescence of the general public, cannot make headway in advance of public opinion. Moreover, in a predominantly Mohammedan community, educationally backward and intensely orthodox, all public health measures, however beneficent in their intention, which affect, or threaten to affect, the home, or even the individual, are immediately suspect and the first reactions they evoke are hostile.

Such measures, therefore, as pre-natal care of women, and infant-welfare work conducted by a medical woman, of indeed any medical work among women other than of a purely domiciliary character (and even this is sometimes resented), such measures as anti-tuberculosis schemes or anti-venereal schemes, which have grown in Western countries and even in some parts of India, to be so important a part of the public health work, are foredoomed to failure if they are launched in advance of a substantial body of public opinion. This is not a plea for a policy of *laissez faire*; it is a warning against that optimism which is blind to realities.

The education of public opinion in Aden, perhaps more than in other Eastern towns, is an extremely slow and often a very discouraging process, but there can be no doubt that it ought to be pursued. Means are now under consideration by which it is hoped public interest may be aroused, and where there is public interest, there is a possibility, later, of public acquiescence, that essential preliminary to any scheme for improvement of the health of the community which makes any demand on individual effort or on

public co-operation. Once this is secured, the way is open for further advance, but even then the watchword of the sanitarian in Aden must always be 'Festina lente'.

REPORT OF THE CHEMICAL EXAMINER TO
THE GOVERNMENT OF MADRAS (LOCAL
SELF-GOVERNMENT DEPARTMENT, PUBLIC
HEALTH). 1933. By LIEUT.-COLONEL CLIVE
NEWCOMB, D.M.F.I.C., I.M.S., CHEMICAL
EXAMINER TO GOVERNMENT

This report which has just come to hand deals with a number of subjects of medical and criminological interest. An excerpt of the statistics of poisoning cases with a few selected examples may prove of value to practitioners.

HUMAN POISONING CASES

The total number of human poisoning cases investigated during the year was 372 with 2,116 articles in which 450 people were affected and 277 died, as against 323 cases and 1,722 articles in the year 1932. In 173 cases poison was found (46.5 per cent). The number of human cases received this year is the highest number on record during any year in this laboratory. Though there has been a large increase in the number of cases received, the number of cases in which poison was detected has not increased proportionately (173 cases in which poison was detected this year as compared with 168 cases in which poison was detected last year). This is probably due to the fact that the routine of sending to the Chemical Examiner every suspicious case has become established throughout the Presidency. Poison found was as shown below:—

POISONS DETECTED

Inorganic

Cases	Cases
Arsenic 16	Hydrochloric acid .. 1
Arsenic and mercury .. 5	Lead 1
Arsenic and snake venom 1	Mercury 11
Barium 1	Manganese 1
Bismuth 1	Mercury and potassium per- manganate 1
Bleaching powder 1	Nitric acid 3
Caustic soda 1	Nitric acid and mercury 1
Copper sulphate 6	Nitric acid and sulphuric acid .. 1
Copper sulphate and lead 1	Sulphates 1
Cyanides 6	TOTAL 62
Cyanide and copper sulphate 1	
Cyanide and carbolic acid 1	

Organic

Cases	Cases
Aconitine 4	Nux vomica 4
Aconitine and poisonous resin 1	Oduvan 5
Alcohol 7	Oleander 25
Alcohol and oleander 1	Oleander and copper sulphate .. 1
Camphor 1	Oleander and tobacco leaf .. 1
Chenopodium oil 1	Opium 27
Chloral 1	Opium and tobacco leaf .. 1
Cresols 3	Picrotoxin 1
Croton oil 1	Strychnine 2
Datura and mydriatic alkaloid 8	Tobacco leaf 1
Eucalyptus oil 1	Unidentified poison .. 3
Luminal 1	
Madar 9	TOTAL 111
Marking nut 1	

Opium still heads the list with 28 cases while oleander comes close next with 27 cases. Next follow arsenic with 22 cases and mercury with 17 cases. There were 8 cases of datura or other mydriatic alkaloidal poisons.

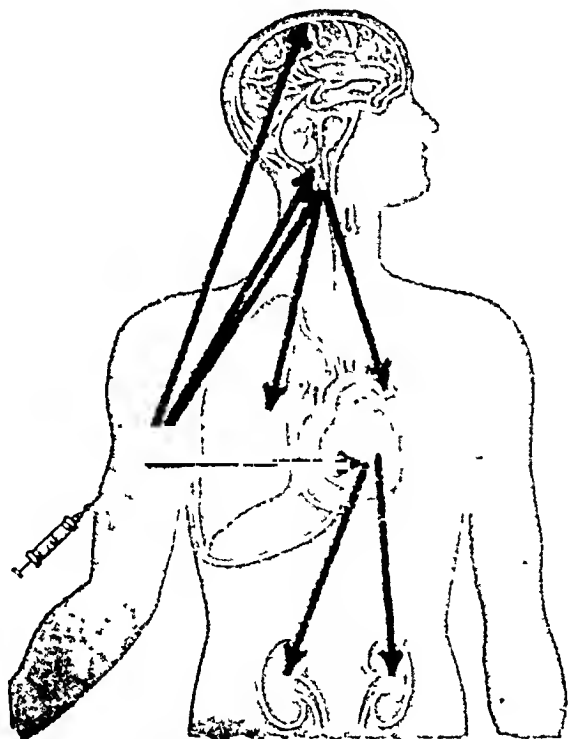
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stimulates the heart
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Liquid, Ampoules

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Sole Agents: Kemp & Co Ltd. Charni Road, Queens Road, Bombay.

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WITH ILLUSTRATIVE CASES

BY

L. A. WADDELL, C.B., C.I.E., LL.D., F.L.S., M.B., Lt.-Col., I.M.S. (Retd.)

New Revised and Enlarged Edition, 1934.

Just published. Price Rs. 6-8.

A HANDBOOK ON

DIABETES MELLITUS

AND

ITS MODERN TREATMENT

WITH

HYGIENE, DIET TABLES AND INDIAN RECIPES FOR DIABETIC PATIENTS

BY

J. P. BOSE, M.B. (Cal.), F.C.S. (Lond.)

Published and Sold by

THACKER, SPINK & CO. (1933), LTD.

Medical Booksellers and Publishers, P. O. Box 54, CALCUTTA.

In three cases although a poison was found we could not determine its exact nature.

Madar juice.—We get from time to time cases of fatal poisoning from drinking the milky juice of the plant *Calotropis gigantea*. The symptoms of madar juice poisoning are not very clear as in most cases little information is available as to the nature of the symptoms. It would appear to be not only a gastrointestinal irritant, but also a cerebrospinal poison.

In one case a woman drank the juice at about 7 a.m. The symptoms began at 7-30 with vomitings and purgings followed by convulsions in which she rolled on the ground. She collapsed and died at about 8 a.m. The post-mortem signs were bloody discharges in the nostrils and mouth, the lungs were congested and the heart was empty. Trachea was injected, liver, spleen and kidney were congested. The stomach was congested and contained about 2 ounces of chyme-like fluid. The small intestines were congested, the brain and the membrane were also congested. We obtained the reactions of madar juice from the stomach and its contents in this case.

Eucalyptus oil.—A young girl, aged 16, drank some eucalyptus oil in mistake for her fever mixture. She was brought to the hospital in a drowsy condition. The breath smelt of eucalyptus oil. The pupils were contracted and reacted to light. The pulse was 115 with fair tension and volume and respiration 24 per minute. The stomach was washed out in the hospital and she recovered. Eucalyptus oil was detected in the stomach wash.

Luminal.—An interesting case of attempted suicide by taking luminal occurred. A man is said to have taken 20 grains of luminal and 3 grains of potassium permanganate. Within about 40 minutes he was removed to hospital. On admission he was drowsy and kept his eyes shut, and he talked incoherently, and kept grinding his teeth. When questions were put to him loudly he answered very slowly as if he emphasized every word. There was watering of the eyes. The pupils were equal and reacted to light. He was occasionally boisterous. The pulse was 110 and respiration 28. The stomach wash obtained in this case showed about 1½ grains of luminal. The stomach wash was only 8 ounces in volume, and as luminal is fairly insoluble in water, a small stomach wash like this is not likely to contain the whole of the luminal present in the stomach. The normal dose of luminal is 1½ to 5 grains and up to 12 grains as a maximum dose. Severe symptoms, dizziness, nausea, vomiting, double vision are reported from 4½ grains in one case. Disturbance of speech, ataxia with inability to stand and diminished reflexes followed after 9 grains in one case, and after 13½ grains along with 3 grains of veronal in another case. Coma, loss of reflexes, anaesthesia of skin and severe disturbances of pulse and respiration, and amaurosis continuing for 22 days followed a dose of 36 grains taken with suicidal attempt. Two hundred and thirty grains taken in the course of three weeks proved fatal in one case. The man was charged with attempting to commit suicide but acquitted chiefly on the ground that there was no proof that he had taken a fatal dose or a dose likely to prove fatal. Where, however, a man takes poison and recovers it is generally impossible to prove how much of the poison he did take. In the hurry and excitement of washing out the stomach of a poisoned man some of the stomach wash fluid is very likely to be spilt and lost or the patient is likely to have vomited out a large portion of the poison before he ever reaches a doctor. Moreover some of the poison must be absorbed and some passed on to the small intestines where it is out of the reach of a stomach tube. The exact amount he has taken is therefore generally impossible to prove, and since the man has recovered the part of the total dose found in such of the stomach washes or vomits as have been preserved, is not likely to amount to a fatal dose. So far as attempted suicides are concerned this is not

perhaps a very serious matter, but the same arguments apply to attempted murder by poison.

THE LEPROSY SURVEY OF CEYLON, 1933. BY R. G. COCHRANE, M.D., M.R.C.P., D.T.M. & H. (ENG.)

THIS report which has just been published contains some useful advice in regard to the general policy of treatment in leprosy.

The 'Leper Ordinance' laid down very definitely that every sufferer should be brought under segregation, except where the authorities considered that the home conditions were good enough to justify the granting of 'home isolation'. The Ordinance has left sufficient latitude to allow officers to use their discretion in isolating cases, but the knowledge at the time it was promulgated was not sufficient for them to make use of the loopholes which were wisely provided. One thing, which will be mentioned again later, is the regulation concerning 'home isolation'. In our investigations we discovered that in those cases where regulations of this nature were necessary, the patient either could not or would not abide by them and in those cases not needing isolation the regulations imposed were altogether too irksome. I consider the working of this part of the Ordinance most unsatisfactory.

Modification of leprosy ordinance.—Before we can consider any special methods for controlling leprosy it is essential to consider in what respects the present Ordinance needs modifying. The present system of notifying a case of leprosy is altogether too rigid. In the first place when a person is found to be suffering from leprosy, no matter whether he is an early or late case, an infective or non-infective case, once declared to be a 'leper', in terms of the Ordinance segregation must follow, unless home isolation is granted. If the case, as it occasionally does, happens not to be suffering from leprosy the unfortunate individual seldom can get release from the asylum under three months. While leprosy ordinances are useful they should be looked upon in the same light as an emergency measure, not to be applied unless it is unavoidable. The result of the enforcement of the Ordinance has been threefold:

(1) Neural cases have been admitted, or readmitted, who, according to present knowledge, do not need segregation.

(2) The criteria for the discharge of a patient have generally speaking not been strict enough.

(3) The granting of home isolation, a provision made to avoid segregation, has resulted in an unsatisfactory state of affairs.

The place of institutions.—Ideally there should be provision made for five classes of patients:—

(a) Early infective cases likely to improve under treatment.

(b) Late infective cases not likely to improve under treatment.

(c) Infective cases among children.

(d) Crippled cases who are a charge on the Government.

(e) Paying patients.

Training and propaganda.—Every medical officer in a country where leprosy is prevalent should have an adequate course of instruction in the diagnosis, treatment, and prevention of the disease. It is not sufficient only to be able to diagnose a case, but what is equally important is the ability to determine whether it is one needing observation only, observation and treatment, or isolation.

This training should be in the form of pamphlets and popular lectures and should lay emphasis on the following points:—

(1) Leprosy is an ordinary disease and that there is no shame attached to it.

(2) Leprosy is a mildly contagious disease and that only certain cases need treatment.

(3) Leprosy frequently starts in childhood or early adolescence, but many children who show early signs of a leprotic infection do not need treatment, the signs disappearing by the time adult life is reached.

(4) The importance of watching such children and insisting that they should not be treated as outcasts, but left in school to carry on their studies.

(5) The lack of necessity for dismissing a child with active early neural leprosy. It should be given out-door treatment at a suitable institution and kept at school.

(6) The necessity for the isolation of all infective cases.

(7) The necessity for observing early signs and the importance of periodic examination of these children and need for examining all the child's contacts.

Indiscriminate propaganda is a two-edged weapon, and unless care is exercised and if excessive propaganda is embarked on, the general public are liable to expect more from the results of treatment than are really warranted. In pamphlets and lectures with a view to instructing the public the following points should be stressed:—

(1) Leprosy is an ordinary disease communicated by close contact by a person in the infectious stage; it is neither venereal in origin nor a curse of God.

(2) Only certain stages are infective, and if cases are declared early then the chances of healing are much better.

(3) Every case does not need treatment; there are many forms which are harmless but need watching periodically.

(4) Only those cases dangerous to the public will be segregated; others can be treated either at a special leprosy prevention centre where such exists or at any Government hospital.

(5) Children in the early stages or employees need not leave their school or place of employment, but should be examined periodically.

(6) The necessity for the periodic examination of all persons who have come into contact with an infected individual.

(7) A healthy body is the best defence against leprosy, and the development of a public health sense is one of the greatest factors against the spread of the disease.

All headmen and those who sway public opinion, e.g., the press, should receive information containing the above facts. In the list of diseases taught in school hygiene and to the public, leprosy should be included. Films and posters of an educative nature can be had from the Indian Council of the British Empire Leprosy Relief Association. Lantern slides and a cinema film are also obtainable. A pamphlet for popular use and articles for the press might be prepared and in this way a more reasonable attitude can be developed.

Correspondence

TREATMENT OF SOFT SORE AND BUBO

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR,—I am prompted by the article which appeared in the July number of the *Indian Medical Gazette* to give my own experience in the treatment of soft sore and its frequently resultant bubo.

This was gained in dealing with some hundreds of cases as dermatological specialist at Karachi during the immediate post-war period, in 1919.

Locally, sores were treated with ionization and some such simple dressing as eusol, but this was always considered of secondary importance to vaccine treatment both for sores and buboes.

The latter were never opened even as a last resort. The method of dealing with them was by aspiration, a 5-c.cm. syringe and a medium-sized needle being used.

The latter is entered through healthy skin at least half an inch from the discoloured skin over the bubo and as much pus as possible evacuated. This procedure was repeated as often as pus collected. Even with skin over the bubo thinned to bursting point it was occasionally possible to obtain a cure without rupture and the needle track was rarely infected.

Two chief organisms, *Staphylococcus albus* and diphtheroids are found in this disease.

Cultures from fresh cases were constantly made, killed with carbolic and added to two stock vaccine bottles, one *albus*, the other diphtheroids. A mixture of the two was given.

The results of the vaccine were surprisingly quick in lessening pain and bringing about healing of the sore and subsidence of the bubo especially in the early stages of the latter.

It is noteworthy however that the same vaccine after being stored for six months was found to be worthless.

The conclusion drawn from this, rightly or wrongly, was that it was necessary to constantly reinforce it with fresh culture; in other words that it lost its potency with age.

I came to look on the fresh vaccine as the sheet anchor of treatment, and the opening or bursting of buboes as a disaster.—Yours, etc.,

J. F. JAMES, M.B., Ch.B. (Edin.),
D.M.R.E. (Cantab.), LIEUT.-COL., I.M.S.

COMBINED INDIAN MILITARY HOSPITAL,
RAZMAK,
20th August, 1934.

AN ALLERGIC MANIFESTATION

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR.—My son, aged 20 years, was bathing in cold water at a hilly place in summer, seven years ago; he got urticaria-like eruptions and felt a tingling sensation all over the whole body; he became blind at the same moment; but after two hours the eruptions and blindness passed off and he quite recovered.

Now whenever it becomes too cold he gets urticaria-like eruptions, but recovers soon in the sunshine or by sitting near the fire.

I have tried many medicines, but they have proved useless. Can you throw any light on the pathology and treatment of such a condition?—Yours, etc.,

HARKISHAN DAS, L.M.P.,
Medical Officer in Charge,
Billawer Dispensary.

JAMMU PROVINCE,
16th February, 1934.

[Note.—The history suggests that the case may be one of physical allergy. Bray (1932, *Proc. Roy. Soc. Med.*, XXV, 131) describes a case of allergy to cold in a boy of eight years. Mere putting of a finger into cold water in this case caused severe itching and swelling. The case was successfully treated by repeated injections of small doses of histamine. It might be worth while giving a trial to the same remedy in this case.—EDITOR, I.M.G.]

ROUNDWORMS CAUSING INTESTINAL OBSTRUCTION

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR.—Intestinal obstruction is a condition which calls for active surgical interference. The following case of obstruction caused by worms simulated this condition so much that but for mere chance the patient would have undergone an operation. I had once read of a similar case reported in the *Indian Medical Gazette*, but had never come across one myself, and rarity of its occurrence is my only excuse for reporting the cases.

I was called in to see a girl aged 5 years, suffering from constipation and sleeplessness for the last four days. Previous to my seeing the patient she was advised operation by the physician treating her. I found all

the symptoms of acute abdomen except vomiting. I administered a soap-and-water enema with a few drops of turpentine to allay distension. The enema was rejected and after some time I repeated the enema and this time the child passed a worm with hard faecal matter. This settled it. She was put on paraffin and calomel and santonin powders on alternate days; she passed 75 roundworms and made an uneventful recovery.—Yours, etc.,

G. R. VAIDYA, L.C.P.S.

NAVAPURA STREET, RAJPIPLA,
GUJERAT STATES AGENCY.
21st July, 1934.

Service Notes

APPOINTMENTS AND TRANSFERS

LIEUT.-COLONEL W. J. SIMPSON, Residency Surgeon, Mewar, is appointed to officiate as Resident in Mewar and Political Agent, Southern Rajputana States, in addition to his own duties, with effect from the afternoon of the 11th August, 1934, and until further orders.

Major M. P. Atkinson is appointed substantively to be an Agency Surgeon under the Government of India in the Foreign and Political Department with effect from the 31st March, 1934.

Major E. C. A. Smith is appointed to be Superintendent, Central Mental Hospital, Yeravda, on his return from leave.

The services of Major A. C. Craighead, an officer of the Medical Research Department, are replaced at the disposal of the Army Department with effect from the 27th May, 1934.

Major W. J. Webster, M.C., is appointed to officiate as Assistant Director, Central Research Institute, Kasauli, with effect from the date on which he assumes charge of his duties.

The services of Captain H. W. Farrell are placed temporarily at the disposal of the Government of Bihar and Orissa, with effect from the 16th July, 1934.

LEAVE

Lieut.-Colonel J. C. De is allowed leave for one year, with effect from the 1st September, 1934, or the date of availing.

PROMOTIONS

Majors to be Lieut.-Colonels

F. Oppenheimer. Dated 30th July, 1934.

P. Savage and Jamal-ud-din. Dated 1st August, 1934.

H. G. Alexander and P. D. Chopra. Dated 6th August, 1934.

A. S. Fry. Dated 14th August, 1934.

RETIREMENT

Colonel G. D. Franklin, C.I.E., O.B.E., retires 28th July, 1934.

RELINQUISHMENT OF APPOINTMENTS

Lieut. W. M. E. Anderson. Dated 7th June, 1934.

Lieut. H. B. Wright. Dated 7th June, 1934.

Notes

RADIO-MALT

RADIO-MALT is a palatable combination of radiostoleum (vitamins A and D) with measured amounts of concentrated extracts of yeast and malt containing vitamins B₁ and B₂ in standardized proportions. In Radio-Malt these four vitamins, which are lacking most often in the normal dietary, are exhibited in constant standardized amounts and in those balanced proportions which have been proved in clinical practice to be the most suitable for prophylactic purposes. Such constancy and balance cannot be assured in preparations

containing *natural* fish-liver oils, as in such the vitamin content is left to the vagaries of nature and, as a consequence, there is no fixed relationship between the content of one vitamin and that of another. For Radio-Malt therefore certain advantages over cod-liver oil and halibut-liver oil can be claimed.

Furthermore, by most careful study, The British Drug Houses have arrived at methods of exhibiting the vitamins in such a way that they remain stable, with the result that Radio-Malt retains its full activity even after long storage; hence it provides the physician with a simple medium for the daily administration of those vitamins (A, B₁, B₂ and D) of which there is often a serious deficiency in normal dietaries.

In those cases in which a supplementary source of vitamin C is required ample supplies may be assured through the administration of the juices of fresh fruit, oranges, lemons and grape-fruit being particularly rich in this vitamin. Alternatively, this vitamin can be supplied in accurate dosage through the medium of tablets of pure crystalline vitamin C (Ascorbic Acid B.D.H.).

The vitamin content of Radio-Malt is controlled by nutrition tests carried out in the B.D.H. physiological laboratories. The tests include observations on the growth rate, as well as on the cure, or the prevention, of the specific diseases which develop in experimental animals when the diet supplied is deficient in the vitamin under test.

Uses.—Radio-Malt finds an important place in preventive medicine; its use is not restricted to any particular age or sex, and for this reason it has a wide application in general practice.

For example, Radio-Malt is prescribed for pregnant and lactating women in order to provide a sufficiency of vitamins A and D to enable the mother to withstand infection at parturition, and to maintain correct phosphorus and calcium metabolism so that the bones of the foetus and of the child become normally calcified. Radio-Malt also tends to prevent the development of anaemia; further, it checks constipation and the uncontrollable vomiting of pregnancy and, generally, enables the mother to maintain a sufficiency of reserves during the time of extra demand.

THE MODERN MANUFACTURE OF ROLLER MILK POWDER

THE manufacture of roller milk powder has assumed enormous proportions, and its use in the artificial feeding of infants is steadily increasing. The protection which it affords against tuberculosis and epidemic milk-borne disease, and the close approximation of the rennin curd in digestibility to that of breast milk are the main factors in determining this universal demand, which is specially applicable in tropical areas where the safe feeding of infants presents a most difficult problem to mothers, nurses and the medical profession.

Since the introduction of the roller process of powdering by Just Hatmaker, great improvements have been effected in the patents, and as exemplified in the improved methods adopted in the Cow and Gate factories this has now reached a perfect standard of efficiency.

Standards of purity of the raw milk

The dangers that lurk in raw milk are too well known to need stressing. A large proportion is affected with the bovine tubercle bacillus, and it is a prolific carrier of epidemic diseases such as diphtheria, undulant fever and scarlet fevers, and enteritis. The first care therefore is to ensure a supply of clean raw milk. With this object in view the milk from the different farmers on arrival at all Cow and Gate factories daily is submitted to a series of routine tests. These tests include:—

1. Sediment test, in which the milk is forced through a cotton-wool disc which traps the coarse dirt. These pads are dried and examined for report by one of the chemists.

2. Determination of fat by the Gerber method.
3. Determination of acidity.
4. Bacteriological examination and count by the Breed method.

The results are filed under the name of each farmer, so that a complete record is available for reference.

Should milk from any source fail to reach the high standard set by the chief chemist it is rejected, and one of the dairy inspectors is told off to visit the farm to enquire into the cause. Every encouragement is given to the farmer to improve his procedure for the supply of clean milk, and inspectors visit the farms to instruct in the latest methods. Filtering and other utensils are supplied free by the company.

There is in existence a bonus scheme by which marks are awarded for the various points and in accordance with the approach of the milk to the maximum a bonus is paid at the end of each month to those farmers who reach a certain figure in the aggregate. This scheme has also had far-reaching repercussions in the general improvement of the liquid milk supplied for general consumption.

CONTRAMINE

CONTRAMINE, or to give it its full chemical name, di-ethyl-ammonium di-ethyl-di-thio-cabamate, is an organic sulphur compound with a complex molecule. It is non-toxic in the doses recommended.

Indications.—Contramine is valuable in such infections as the chronic complications of gonorrhoea, including stricture, chronic epididymitis, conjunctivitis and iritis; in neuritis its administration will often achieve results unobtainable with any other drug and this is equally the case in the various forms of muscular rheumatism such as fibrositis, teno-vaginitis and arthritis. In chronic skin diseases such as acne vulgaris, acne rosacea, seborrhoeic eczema and chronic dermatitis of varied or unknown origin, Contramine administration has been found unique in its beneficial effect.

Contramine prevents and ameliorates metallic intoxication of any origin; therefore, it may be given with advantage along with arsenical preparations in cases found to be intolerant of salvarsan and its substitutes.

Administration and dosage.—Contramine is usually injected intramuscularly, preferably in the gluteus medius, but never in the superficial tissues. The patient should be made to contract the gluteal muscles and the injection should be made towards the outer and upper part of the bulge of the muscle. Painful gluteal injections are due to the medicament going into the gluteus maximus which consists largely of fibrous tissue.

It is necessary to use a needle at least 2 inches in length and of large diameter but with a sharp point. This ensures the necessary deep injection and quick dispersion of the medicament in the muscle tissues. During the course of the treatment it is preferable that the patient should abstain from all alcoholic drinks.

In neuritis clinicians recommend 0.125 gramme in 1 c.c. every third day until six are used, with high colon lavage daily, the result of this treatment causing complete cessation of pain in the course of about ten days.

In severe cases of metallic intoxication 0.125 gramme may be injected every day till six or more doses have been administered. In other cases two injections each of 0.125 gramme with a week's interval between them usually suffice.

Contramine is a softener of fibrous tissue, and many strictures resisting dilatation may be rendered dilatable by the intramuscular injection at approximately weekly intervals of one dose of 0.125 gramme and two doses of 0.25 gramme. This treatment is advised in cases of chronic epididymitis, but it should be succeeded by a course of vaccines because micro-organisms hidden by the fibrous tissue may be released as the latter is destroyed.

S.U.P. 36

For the treatment of acute inflammatory conditions

ALTHOUGH S.U.P. 36 is employed primarily for the treatment of catarrhal conditions and infections of the respiratory system generally, its use is being extended to all acute conditions with pyrexia; in puerperal pyrexia, the injection of 1 c.c. of S.U.P. 36 on two successive days causes an immediate return to normal temperature which is followed by an uneventful recovery.

Other acute conditions in which S.U.P. 36 has been used with success are hyperemesis gravidarum, pyelitis, broncho-pneumonia in children, venous thrombosis, osteomyelitis, acute cystitis, acute mastoiditis and herpes zoster, whilst in the pyrexia following incomplete abortion and in acute epididymitis timely injections of S.U.P. 36 have been known to cause a reduction of temperature of 103°-104° to 99° within twelve hours.

Further, during a recent epidemic of measles it was found that injections of S.U.P. 36 in doses of 0.005 to 0.0075 gramme prevented catarrhal involvement and cough, all treated cases proceeding to recovery without complications. On the other hand, control cases receiving no injection of S.U.P. 36 manifested the usual symptoms involving inflammatory conditions of the ear, nose, and throat with the accompanying characteristic cough.

Finally, although essentially a therapeutic substance, S.U.P. 36 has been employed with success as a purely prophylactic remedy for the prevention of colds and influenza during the winter months. It is injected also as a precautionary measure before operation in order to diminish or prevent post-anæsthetic vomiting.

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Original Articles

A SIMPLE METHOD OF RECOVERING
TYPICAL CULTURES OF DERMATO-
PHYTES FROM PLEOMORPHIC
GROWTHS

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THE preservation of the typical ringworm cultures in a laboratory medium has always been very difficult, as they usually become 'downy'. Therefore the discovery of a means by which they can be made to revert to their true type is a matter of great importance.

When cultures true to type have been kept growing for some time in a laboratory medium, they undergo pleomorphism, in spite of repeated subcultures. In this connection the term pleomorphism was first used by Sabouraud, and it is defined as follows:—The cultures lose all the characters of the type and form *duvets*, i.e., exuberant downy growths; this process goes on indefinitely, even in subcultures, and normally such cultures never revert to their original or true type. Microscopically, they do not usually show any end-organs and, depending on the stage of degeneration, the cultures may contain only mycelia or rarely aeciospores. The mycelia are long, wavy and contain very little plant volutin.

Pleomorphism has been the chief difficulty in the study of dermatophytes and it appears probable that many so-called distinct species are only degenerate forms of species already known. Some species exhibit this character more markedly than others, and this applies to animal microspora particularly. In the case of *Microsporon lanosum* we could never recover the true type from the subcultures of a pleomorphic growth until we employed the method described below.

The saprophytic origin of ringworm dermatophytes has been recognized for a long time, and Sabouraud (1910) first succeeded in growing them on decaying vegetable matter of various kinds, such as moist and dry leaves, rotten wood, seeds and straw and also in mineral solutions. Langeron and Milochévitch (1930) used cereals, such as wheat, barley, and oats, dung, and fungus slopes as their media for the culture of ringworm fungi. These media were found favourable for the growth and development of certain dermatophytes in order to show the various end-organs.

Nannizzi (1926 and 1927) followed Sabouraud's work and showed that these fungi would also grow saprophytically upon animal matter

of various kinds, viz, leather, feathers, bones, and earth containing manure. He used these substances as laboratory media and called them 'natural media' in contra-distinction to the artificially-prepared media usually employed. These dermatophytes grow parasitically in man and animals.



Text-fig 1—Cultures of ringworm fungi on feathers

We have confirmed the work of Sabouraud, Langeron and Milochévitch, and Nannizzi, and have successfully grown ringworm fungi on rotten leaves, wood, bath planks and mats, mud, cereals, leather, feathers and animal manures. They appear to be able to live on these substances for a long time if moisture is present, but eventually they become pleomorphic in the same way that they do on artificial media.

The fungi of the *Achorion* type can rarely be made to grow on natural media, and on artificial media they do not grow as luxuriantly as do the ordinary ringworm fungi but remain true to type for much longer periods, and continue to produce typical end-organs. It thus appears that the cultures that grow most luxuriantly and produce profuse branching mycelia have few if any spores, as the conditions are more favourable for growth of the fungus than for production of end-organs.

We decided to reduce artificially the favourability of the conditions under which the

were made. For the preliminary subcultures of these fungi we selected feathers as being the most nearly comparable to human hair and skin, both chemically and anatomically. The feathers were mounted on plaster-of-Paris



Text-fig. 2.—*Microsporon lanosum* showing mycelia with close septa. The growth is on feathers two months after the inoculation of pleomorphic cultures from Sabouraud's medium. Magnification—1/6 inch objective $\times 10$ ocular ($\times 250$ approximately).

blocks and put in test tubes three-quarters of an inch by six inches with a little water at the bottom to maintain sufficient moisture for the growth of the fungus. The tubes were plugged with cotton-wool and sterilized in the autoclave at 120°C . The feathers were then inoculated on the rachides with pleomorphic cultures from Sabouraud's medium. They grew very satisfactorily on the feathers as long as there was water in the tubes. The growth which was at first of a *duvet* type, began to dry and shrink, and to adhere more and more intimately to the feathers after the water dried up in the tubes (text-fig. 1). In the *duvet* stage they contained only mycelia with or without aleurines, but when they dried they showed mycelial shreds and spores, isolated or in chains. The spores were like those found on infected hair (plate XIV, fig. 4).

At this stage they were inoculated on different standard media, namely, Sabouraud's (maltose peptone agar) medium, liquid maltose peptone, and wheat medium. The result was satisfactory because the fungi were found to have lost their pleomorphism and to have reverted to type (plate XIII, figs. 1, 2 and 3). Liquid

maltose or glucose peptone is a new medium that we have devised; it contains one part of bacto-peptone, two of ordinary maltose or glucose, in a hundred parts of water, and is adjusted to a pH of 7.0 (plate XIII, figs. 4 and 5).

Experiments were performed with pleomorphic cultures of known species and the results are given below in the table

Experiments.—The first series of experiments were undertaken with the pleomorphic cultures of known ringworm fungi, namely, *Microsporon felineum*, *Microsporon lanosum*, *Microsporon pubescens*, *Trichophyton persicolor*, *Microsporon*



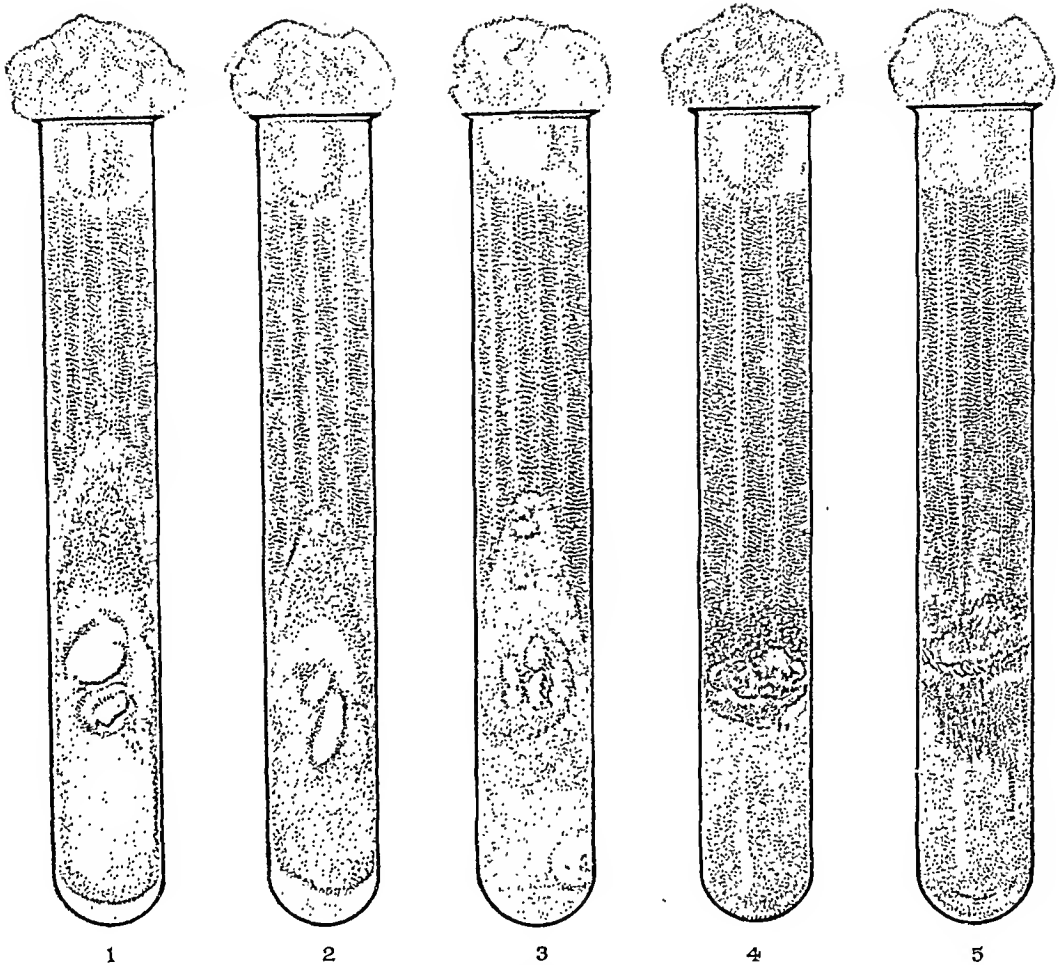
Text-fig. 3.—*Microsporon felineum* showing end-organs (aleuriospores and spindles) in liquid maltose peptone medium. Magnification—1/6 inch objective $\times 10$ ocular ($\times 250$ approximately).

fulvum and *Epidermophyton cruris*. These fungi were first inoculated on to feathers and allowed to grow for about eighteen weeks, sufficient water to keep them moist being added from time to time; they were then allowed to become dry. After being kept in a dry condition for one month subcultures were made on the following media:—Sabouraud's maltose peptone agar slopes, wheat, and liquid maltose peptone.

A second series of inoculations, similar to the first one except that the subcultures from the feathers were delayed another week, were made into these various media. The results are shown in the table; there was little material difference between the results of the first and second series.

In a third series, cultures of *Achorion gypseum*, *Trichophyton asteroides* (*gypseum*) and *Trichophyton radiolatum* were inoculated on to feathers and kept growing in a moist condition for about sixteen weeks. They were allowed to dry, kept in this state for a month and subcultured on the same media as the other fungi. The results are also shown in the table.

PLATE XIII



True type of cultures showing a granular appearance after culturing from feathers on Sabouraud's medium.

Fig. 1. *Trichophyton persicolor*.

Fig. 2. *Microsporon felineum*.

Fig. 3. *Epidermophyton cruris*.

True type of cultures of *Epidermophyton cruris* on

Fig. 4. Liquid maltose peptone medium.

Fig. 5. Liquid glucose peptone medium.

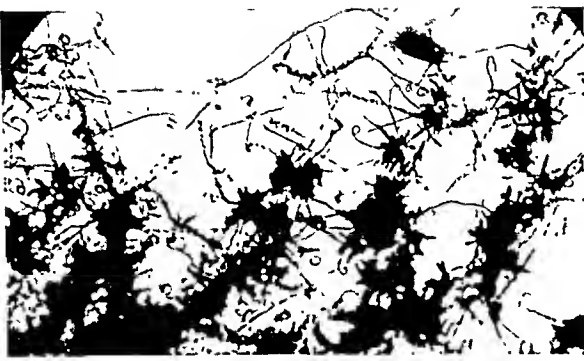


Fig. 1.—*Epidermophyton cruris* showing numerous end-organs, namely aleuriospores in groups, spindles and tendrils. Magnification— $\frac{2}{3}$ inch objective $\times 10$ ocular ($\times 50$ approximately).



Fig. 2.—*Trichophyton persicolor* showing end-organs (spindles) on feather. Magnification— $\frac{1}{6}$ inch objective $\times 5$ ocular ($\times 150$ approximately).

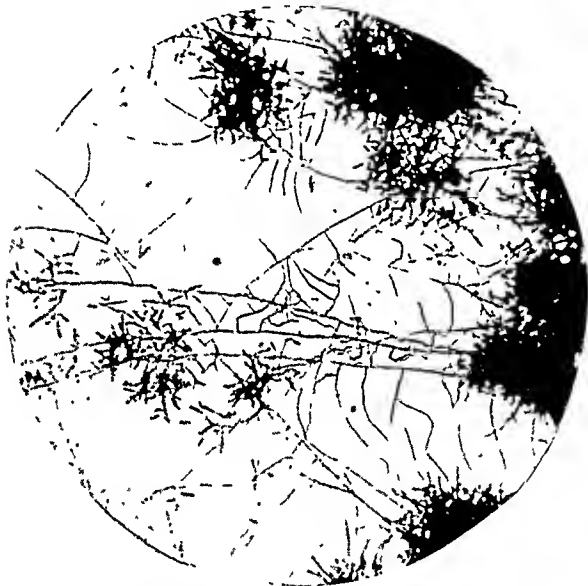


Fig. 3.—End-organs (numerous spindles in clusters) of *Microsporon felineum* on Sabouraud's medium, after subcultures from feathers. Magnification— $\frac{2}{3}$ inch objective $\times 10$ ocular ($\times 50$ approximately).



Fig. 4.—*Microsporon lanosum* showing formation of spores on feathers. (Magnification $\times 400$ approximately).



Fig. 5.—*Microsporon fulvum* showing numerous tendrils and a few spindles and aleuriospores in groups after subculture from feathers on Sabouraud's medium. Magnification— $\frac{2}{3}$ inch objective $\times 10$ ocular ($\times 50$ approximately).



Fig. 6.—*Microsporon equinum* showing spindles in dried Sabouraud's slopes. Magnification— $\frac{2}{3}$ inch objective $\times 10$ ocular ($\times 50$ approximately).



Fig. 7.—*Microsporon lanosum* recovered true to type from pleomorphic culture (culture on wheat medium from feather). Magnification— $\frac{2}{3}$ inch objective $\times 10$ ocular ($\times 50$ approximately).

TABLE

Species	Type of growth in Sabouraud's medium before inoculation on to feathers	Character of growth on feathers when there was moisture in the tube	Growth on feathers at the time of inoculation in different media after the tubes had been dry for a month	Culture on Sabouraud's slope	Culture on wheat	End-organs in Sabouraud's medium.	End-organs in wheat	End-organs in liquid peptone maltose
<i>Microsporon lanosum.</i>	Pleomorphic (<i>duvet</i>).	Mycelia with close septa (text-fig. 2).	Spores + + + in chains, mycelia few (plate XIV, fig. 4).	Pleomorphic (<i>duvet</i>).	True type, covered with <i>duvet</i> .	No end-organs. Pleomorphic (<i>duvet</i>).	Aerial hyphae show end-organs (plate XIV, fig. 7). Later covered with <i>duvet</i> . Typical	Mycelia with aleuries, intercalary chlamydospores. Later covered with <i>duvet</i> in a week. Typical (text-fig. 3).
<i>Microsporon felinum.</i>	Do.	Pleomorphic (<i>duvet</i>).	Spores +. Mycelia—nil.	Growth—coarsely granular (plate XIII, fig. 2).	Later with coarsely granular.	Typical (plate XIV, fig. 3).	Typical	Typical
<i>Microsporon pubescens.</i>	Do.	Do.	Mycelial shreds +. Spores in chains.	Pleomorphic (<i>duvet</i>).	Pleomorphic (<i>duvet</i>).	No end-organs	No end-organs	Mycelia with intercalary chlamydospores. Typical.
<i>Trichophyton periscolor.</i>	Do.	Showed end-organs* (plate XIV, fig. 2).	Spores + +. Mycelia + +.	True type mixed with <i>duvet</i> (plate XIII, fig. 1).	Downy growth	Typical	Typical	Very typical.
<i>Microsporon fulvum.</i>	Do.	Pleomorphic (<i>duvet</i>).	Mycelia + +. Spores +.	True type at thinnest part of slope.	Downy, mixed with coarse granules.	Very typical (plate XIV, fig. 5).	Very typical	Typical.
<i>Epidermophyton cruris.</i>	Partly degenerated.†	Partly degenerated.†	Mycelial shreds + + +. Spores + +.	Partly <i>duvet</i> and partly true type (plate XIII, fig. 3).	Downy growth	Typical (in parts showing true type of growth) (plate XIV, fig. 1).	Typical	Typical.
<i>Achorion gypseum.</i>	Showing typical end-organs.	Mycelia with aleuries and spindles.	Numerous spindles and mycelia.	True type, mainly, mixed with <i>duvet</i> growth.	True type, mixed with <i>duvet</i> growth.	Typical end-organs mixed with <i>duvet</i> mycelia.	Typical end-organs mixed with <i>duvet</i> mycelia.	Typical end-organs, numerous spindles.
<i>Trichophyton asteroides gypseum.</i>	Downy, showing mycelia and aleuries and ill-formed spindles.	Mycelia with aleuries and few ill-formed spindles.	Free spores + + +. Mycelia + + +.	Downy growth	Downy growth	Mycelia and conidia in groups and isolated.	Mycelia and conidia in groups and isolated.	Conidia in groups and isolated.
<i>Trichophyton radiolatum.</i>	Do.	Do.	Mycelia + + +. Free spores + + +.	Do.	Do.	Do.	Do.	Numerous spindles, conidia in groups and isolated.

* Showed end-organs on feathers (spindles).

† Showed aleuries in groups, but no spindles.

It is evident from the table that the production of true-type cultures mainly depends on the stage of the original culture, i.e., whether it contains mycelia or spores, from which we take our inoculum. Spores appear to give rise to the true type which show the characteristic end-organs, and mycelia to the *duvet* type of growth in which no end-organs are seen.

The true type of growth can be recognized in a mixed pleomorphic and true growth by the appearance of dirty-white coarse granules which are rich in end-organs, including spindles.

Reversions to true type in drying cultures.—True-type cultures can also be obtained in Sabouraud's medium, even from a *duvet* growth in the way described below.

If Sabouraud's slopes inoculated with the dermatophytes, pleomorphic at the time of inoculation, are kept, after some time the thinnest parts of the slopes dry, but the growth continues till the whole tube dries up; this takes six to seven months in this country. Before they reach this stage, however, some of the tubes show a uniform layer or isolated areas of dirty-white coarse granules at the dry and thin end of the slope. These granules when examined microscopically show numerous end-organs, including typical spindles, as we found in the case of *E. cruris*, *M. fulvum*, and *M. equinum*. Thus, tubes inoculated on the 16th May, 1933, with *M. equinum* in pleomorphic form and examined from time to time up to two months did not show spindles at all, but on the 17th January, 1934, when they were re-examined by chance among an old stock of tubes that had been discarded after subculture, the typical end-organs were seen (plate XIV, fig. 6) on the areas of the slope showing brownish granules.

This phenomenon can be explained on the ordinary laws of self-preservation of species—when food supplies are abundant the race is mainly concerned with reproduction of individuals (hyphæ), but if food conditions are limited, then the main concern becomes the conservation of the race.

When the fungi get sufficient nutrition and moisture there is so much exuberant growth of the aerial hyphæ and they give out branches so quickly that the end-organs scarcely grow, or do not grow at all. Therefore, when the fungi are seen under the microscope the end-organs are absent, or even when a few of them are present they cannot be seen through the exuberant growth of mycelia.

When the conditions are unfavourable from want of moisture or nutrition or both, the growth is naturally poor, and in order to preserve the species resistant spores, in the form of end-organs which can withstand unfavourable conditions, are formed.

(Continued at foot of next column)

BASAL METABOLISM OF INDIANS IN HEALTH AND DISEASE—ITS CLINICAL SIGNIFICANCE

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Introduction.—The subject of basal metabolism has, during the last few years, become of considerable importance in the practice of medicine. The clinical significance of its determination in certain diseases is growing in importance and is slowly beginning to occupy a prominent place in the field of internal medicine. The information which the measurement of the basal metabolic rate conveys, not only adds a very valuable link to the chain of evidence upon which the diagnosis of certain diseases rests (specially those in which a dysfunction of certain endocrine glands is suspected), but, what is more important, it gives us very valuable data for determining the severity of the case, and for indicating the line of treatment to be adopted in the individual case.

It may be said at the outset that the present paper has been written, principally from the clinical point of view, with the object of bringing the subject out of the intricate realm of pure physiology into the domain of clinical medicine. Wherever it has been found necessary to describe the various methods of determination, only the underlying principles of the technique have been described.

(Continued from previous column)

Résumé

I. The specific cultural characteristics of ringworm fungi can be restored by subcultivating from pleomorphic cultures by the method described.

II. Pleomorphic cultures on Sabouraud's media, when allowed to dry and with age, form end-organs and the standard type of growth can then be obtained on subculture.

III. In liquid maltose peptone media made from the chalky part of these drying cultures, ringworm fungi show profuse growth of end-organs.

REFERENCES

- Langeron, M., and Milochévitch, S. (1930). Morphologie des Dermatophytes sur Milieux Naturels et Milieux à Base de Polysaccharides. *Ann. Parasit. Humaine et Comparée*, Vol. VIII, p. 422.
- Nannizzi, A. (1926). *Ricerche sui Rapporti Morfologici e Biologici tra Gymnoascacee e Dermatomicetiti*. R. Friedlaender & Sohn, Berlin.
- Nannizzi, A. (1927). *Il Gymnoascus gypseum sp. n., forma ascofora del Sabouraudites (Achorion) gypseum (Bodin) Ota et Langeron: Nota preventiva*. Istituto Botanico della R. Università di Siena. Stab. Arti. Grafiche S. Bernardino, Siena.
- Sabouraud, R. (1910). *Les Teignes*. Masson et Cie, Paris.

The senior author has been working on this subject off and on for over 12 years and has collected a large amount of data—referable to both health and disease—which the present paper embodies.

Definition

Basal metabolism or 'standard metabolism' as it is sometimes called is a term which is used to represent the total energy (heat) output of the body when it is at complete physical and mental rest. We know that the metabolic activity of the body is lowest when it is at complete rest and without food (for at least 14 to 16 hours). Under such condition the activity of the various organs, such as the heart, lungs, liver, kidneys, etc., is reduced to a minimum. At such a time also the metabolism is not under the direct influence of the stimulus—the specific dynamic action—which foods are known to exert. This low rate of energy exchange of the body is called the basal metabolism, i.e., the level of metabolic activity which is purely and simply associated with the maintenance of the automatic functions and the body heat. It may roughly be said that under such resting conditions, approximately 25 per cent of the basal energy (heat) output is due to the functional activity of the heart, the respiratory movements, the liver and the kidneys and the remaining 75 per cent of the basal energy represents the total heat production of the resting tissues such as the skeletal muscles.

History of metabolism

The history of metabolism is closely associated with that of respiration and credit is due to Lavoisier, the founder of metabolic research, who in 1780 thought that oxygen played a very important part in the functions of all the bodily processes. Lavoisier was, however, mistaken as to the origin of the heat production, believing as he did that oxygen combined with hydrogen and carbon in the lungs to form heat. It was more than half a century after his death that it was shown for the first time that the ultimate source of body heat was mainly the oxidation in the body of the three types of food-stuffs—carbohydrates, proteins and fats. The difference in the chemical composition of these three types of food-stuffs would naturally account for the fact that different amounts of oxygen would be necessary to burn them and different quantities of energy (heat) would be liberated. Thus, it appears that since metabolic processes are essentially oxidative in nature, involving the utilization of oxygen, the liberation of carbon dioxide and the production of energy in the form of heat, basal metabolism may be expressed in terms of any one of these three factors, viz—

- ✓(1) the actual amount of heat (calories) produced;
- ✓(2) the actual amount of oxygen consumed;
- ✓(3) the actual amount of CO₂ liberated.

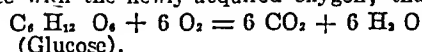
While on this subject a short discussion of what 'respiratory quotient' means would be helpful for the proper understanding of the metabolic processes involved in the oxidation of various kinds of food-stuffs in the system.

The term 'respiratory quotient' was first applied by Pfüger to indicate the ratio of the volume of carbon dioxide expired to the volume of oxygen inspired during the same interval of time. This is expressed by the simple ratio :

$$\frac{\text{vol. of CO}_2}{\text{vol. of O}_2}$$

We know that all food-stuffs, viz, carbohydrates, proteins and fats, when burnt in the system, consume oxygen and liberate CO₂ but the relative amounts of these gases vary according to the kind of material oxidized. Thus, it appears that the determination of

the respiratory quotient will indicate the nature of food-stuffs which is being oxidized in the system. Take for example the combustion of carbohydrates. According to its structural formula, we know that this food-stuff contains two atoms of hydrogen to one atom of oxygen, that is, these two elements are present in the exact proportion to form water and when they are so united on combustion, all the carbon atoms are free to unite with the newly-acquired oxygen; thus,



It will be seen from the above formula that 6 molecules of oxygen utilized in the combustion of the carbohydrates can unite only with 6 atoms of carbon to form 6 molecules of CO₂, i.e., one molecule of oxygen produces one molecule of CO₂. We know that according to Avogadro's law, equal volumes of gases contain an equal number of molecules at the same temperature and pressure and thus the volume of O₂ consumed in the burning of carbohydrates exactly equals the volume of CO₂ given off. The respiratory quotient is therefore

$$\frac{\text{vol. CO}_2}{\text{vol. O}_2} = \frac{6}{6} = 1$$

In the combustion of protein and fat, however, we see, from their respective formulae, that some of the oxygen consumed is utilized for purposes other than the production of CO₂ and for this reason the volume of oxygen used is greater than that of CO₂ liberated. Therefore, the respiratory quotient of each of these two food-stuffs is less than unity. It has been found by experiments that when protein alone is metabolized, the respiratory quotient is 0.8, and when fat is metabolized alone it is 0.71. A respiratory quotient which is intermediate between these figures indicates the burning of a mixture of food-stuffs.

That the conditions hypothesized in the equations above exist in an animal body during the combustion of food-stuffs can easily be shown by observing the respiratory quotient of animals on different diets. A herbivorous animal such as a rabbit, when it is well fed, invariably gives a respiratory quotient of about 1 whereas a strictly carnivorous animal such as a cat gives a respiratory quotient of 0.7.

The determination of the respiratory quotient is particularly valuable in studying the severity of metabolic error in diabetes inasmuch as it affords a reliable index of the degree of defect in carbohydrate utilization. It is well known that in severe diabetes the respiratory quotient decreases—reaching a figure as low as 0.7 in complete diabetes, indicating that oxidation of fat is taking the main part in the maintenance of the metabolic requirement of the diabetic individual. It is also well known that the respiratory quotient begins to increase as soon as insulin is administered.

Food-stuffs as energy producers

Basal metabolism thus furnishes the starting point from which proceeds all computation of man's nutritive needs. It is expressed as the number of units of heat or calories* liberated per hour or per day. The caloric value of any particular food-stuff may be determined by allowing a weighed quantity of the substance to burn in compressed oxygen in a steel bomb placed in a known volume of water at a certain temperature; whenever the combustion is completed, we find out through how many degrees the temperature of the water has become raised and multiply it by the volume of water in litres. Measured by such a calorimeter (as this apparatus is called) it has been found that the number of calories liberated by burning one gramme

* A calorie (large) is a unit of heat and represents the amount of heat required to raise the temperature of one kilogramme of water through 1°C., or more properly to raise the temperature from 0° to 1°C.

of each of the three main principles of food is approximately as follows:

1 gramme of protein	..	4.1 calories
1 " " carbohydrate	4.1	"
1 " " fat	..	9.3 "

Relation of the basal metabolic rate with the surface area of the body

Roughly speaking, we may assume that the metabolic rate is proportional to the surface area of the body except in infancy. The younger the animal, the greater is the proportionate metabolic rate. Basal metabolism is surprisingly constant between the ages of 20 and 50, with a body of average shape and size. It has been estimated that, during this period, the basal metabolism is approximately 39.7 calories per square metre of the body surface per hour in men and 36.9 calories in women. After 50 years, the basal metabolism again decreases.

The measurement of the surface area of the body, though a complicated process, has been much simplified by Du Bois, who devised a simple formula for measuring the surface area of the body based on the height and weight of the individual alone. This is known as height-weight formula of Du Bois and has been checked by several workers and found to be fairly accurate.

This is expressed as follows:—

$$A = W^{0.425} \times H^{0.725} \times C$$

Where A = Surface area.

W = Weight in kilogrammes.

H = Height in centimetres.

C = Constant = 71.84.

There are several other formulæ and charts devised by different workers for finding out the surface area of the body, of which mention may be made of the prediction table of Harris and Benedict. As the subject is complicated and as this paper has been written from a clinical standpoint, the comparative merits of these have not been discussed.

Methods for determining the basal metabolism

We have already said that basal metabolism may be expressed and calculated in terms of any three of the following factors:—

- (1) The actual amount of calories produced.
- (2) The actual amount of oxygen utilized.
- (3) The actual amount of carbon dioxide liberated.

It thus appears that the practical method of determining the basal metabolic rate in human beings falls mainly under the following two heads, viz:

(1) *Direct calorimetry* which consists in placing the individual inside a calorimeter and actually measuring the amount of heat produced in a given time. The first calorimeter of the direct or chamber type was established by Prof. Atwater and Rosa in 1897. Further modifications of this method were made, the latest types of respiratory calorimeters being those of the Nutrition Laboratory at Carnegie Institution in Boston and of the Russel Sage Institute in New York.

The extreme complexity of the method and great expense of an apparatus of this type makes it impracticable for clinical purposes, though, undoubtedly, this method is one of the most accurate for the determination of basal metabolism.

(2) *Indirect calorimetry* by which is meant calculation of the heat production by means of measurement of the respiration gas exchange. This again falls under two heads:—

(a) *Open or gasometric method* in which the subject breathes through valves which automatically divide the

inspired and expired air. The volume of the expired air in an unit of time is then measured at standard temperature and pressure and the composition of both the expired and the inspired air, as regards the oxygen and carbon-dioxide content, is determined by gas analysis. The actual amount of oxygen absorbed and carbon dioxide eliminated during the test is thus determined, correction being made for temperature and pressure. The calorie expenditure of the individual per square metre of body surface is then determined by calculating the respiratory quotient and the calorie equivalent of the oxygen absorbed. The Tissot spirometer, the Douglas bag, and Haldane's gas apparatus are examples of this type.

(b) *Closed circuit method*.—For clinical purposes, the classical methods of determination of the basal metabolic rate just mentioned had to be much simplified so as to be within easy reach of clinicians and at the same time accurate enough for clinical purposes. The credit of finding out such a simple method goes to the American nutritional physiologist, Benedict of the Carnegie Institute. The apparatus devised by him consists of a system of tubes connected with containers for the absorption of carbon dioxide and moisture, and a spirometer filled with oxygen. The person whose metabolic rate is to be determined breathes into a mouthpiece connected with the apparatus by a short tube. Aided by valves his respired air circulates through this air-tight system. The volume of oxygen in the spirometer decreases according to the amount which the person consumes in a definite period of time. By means of a simple formula this quantity can be calculated in cubic centimetres if an allowance is made for barometric pressure and temperature.

Various modifications of the above method have from time to time appeared—the main principle in all these types of apparatus being the actual determination of the amount of oxygen consumed by the individual within a definite period of time. As previously stated, the basal metabolic rate can also be determined by estimating the carbon-dioxide output of the individual, but the oxygen intake method of determination is generally preferred because this method is subject to less error than the former method for the following reasons:—

(1) for a given change in the respiratory quotient, the calorie value of a litre of oxygen varies only by a quarter as much as that of a litre of carbon dioxide;

(2) any accidental acceleration in breathing has much less effect on the rate of oxygen intake than that of the carbon-dioxide output, which is sometimes increased to a great extent;

(3) the carbon-dioxide output is greatly influenced by changes in the acid-base equilibrium of the body.

At the present time, the consensus of opinion among most eminent authorities on the subject of metabolism is that the determination of the amount of oxygen which a subject consumes under certain test conditions is, *clinically speaking*, the best index of his rate of metabolism.

The calculation of the basal metabolic rate by the above method may be done by either of the two following ways:—

(1) *By calculation on the basis of heat production*

It may be assumed that 16 to 18 hours after the last meal, the tissue metabolism is such that the respiratory quotient is 0.82. The calorie value of 1 litre of oxygen under such conditions is usually assumed to be 4.8 calories per litre. The basal metabolic rate can then be expressed in terms of calories per square metre of the body surface calculated according to the rate of oxygen consumption and compared with that of a normal healthy individual of the same age, sex, height and weight.

Thus the heat production (in calories) of the individual would be as follows:—

Oxygen (in litres) consumed by the subject per hour
 $\times 4.8 = \text{Calories per hour.}$

$$\frac{\text{Calories per hour}}{\text{Surface area (in square metre)*}} = \text{Actual calories per square metre per hour.}$$

Therefore

$$\left\{ \begin{array}{l} \text{Normal calories} \\ \text{per square metre} \\ \text{per hour} \end{array} \right\} - \left\{ \begin{array}{l} \text{Actual calories} \\ \text{per square metre} \\ \text{per hour} \end{array} \right\}$$

$$\text{B.M.R.} = \frac{\text{Normal calories per square metre per hour}}{\text{Normal calories per square metre per hour}} \times 100$$

(2) *By calculation on the basis of oxygen consumption*

The actual amount of oxygen consumed in c.cm. per minute is compared with that of a normal healthy individual of the same age, sex, height and weight. The basal metabolic rate may then be expressed in terms of percentage difference between the normal and actual oxygen consumption per minute of the individual.

Thus

$$\left\{ \begin{array}{l} \text{Normal consumption per} \\ \text{minute (corrected for age and} \\ \text{sex)} \end{array} \right\} - \left\{ \begin{array}{l} \text{Actual consumption of} \\ \text{oxygen per minute (corrected for temperature and pressure)} \end{array} \right\}$$

$$\text{B.M.R.} = \frac{\text{Normal consumption per minute (corrected for age and sex)}}{\text{Normal consumption per minute (corrected for age and sex)}} \times 100$$

The apparatus used

In the routine determination of the basal metabolic rate, we have used the closed circuit method, the particular apparatus used being the Sanborn graphic metabolism apparatus. This has been found to be quite easy to work and at the same time quite accurate for clinical purposes. Tests made on the same individual (normal) on different occasions under similar conditions gave uniformly identical results. The senior author has been working on this type of apparatus for the last 12 years and is of opinion that once the technique is mastered and all the precautions are taken against errors, the results obtained are quite accurate. It may also be mentioned that several times each of the authors experimented on the same subject on different occasions with little variation in the result.

Description.—The apparatus consists of a double-walled east-iron cylinder inside which is fitted a jar containing soda lime. There is about $\frac{1}{2}$ inch of space in between the two walls and inside this the oxygen bell fits snugly. The cylinder has two outer openings at the bottom, one being connected with the soda lime container and the other directly with the oxygen spirometer. The inner opening of the soda lime container is fitted with a rubber valve which opens out when air is blown in through the outer opening (during expiration), but automatically

closes when the air is drawn in (during inspiration). The inner opening of the oxygen spirometer is fitted with a different set of rubber valves which open only when the air is drawn in (inspiration) but automatically close when the air is blown in (expiration). The two outer openings at the bottom of the cylinder are connected by means of two pieces of thick rubber tubing which are united at the outer end by means of a metal connector to which a mouthpiece is fitted. Thus, it appears that when the subject breathes in through the mouthpiece, the valve in the oxygen spirometer opens out and he breathes in pure oxygen, and when he breathes out it goes through the soda lime container (which absorbs CO_2 , moisture, etc.), back into the spirometer.

The oxygen bell thus rises and falls as the subject breathes. There is a kymograph attached to the side of the oxygen spirometer which is worked by a clockwork motor placed at the bottom of the apparatus. There is a pen attached to the kymograph which is so adjusted that it moves up and down with the oxygen bell and indicates the exact level of the oxygen in the bell on the kymograph. As the subject breathes, he takes in the oxygen from the spirometer, the level of the oxygen bell thus getting lower and this is indicated by the pen writing on the chart on the kymograph. The kymograph is adjusted in such a way that it goes completely round once in eight minutes.

The difference between the levels of the oxygen bell before starting the experiment and at the end of eight minutes will thus indicate on the kymograph chart the amount of oxygen consumed by the subject during that period, and from that the oxygen consumption per minute is calculated, after correcting for the temperature* and pressure.

Preparation of the subject for the test

The subject must be in a basal state, i.e., he must be at complete physical and mental rest in bed and in warm surroundings and must not be under the stimulating effect of any food or drink. It is customary to do the test in the morning, at least 12 to 16 hours after the previous night's meal. The nature of the test should be explained to the subject fully and clearly so as to allay his nervousness before and during the test. Whenever possible, a preliminary experimental test should be done on the subject to accustom him to the exact procedure of the test.

The subject should lie in bed in a comfortable reclining position. The head and shoulder must be arranged in a comfortable position by means of pillows so that the subject can breathe naturally and has no difficulty in swallowing

* Calculated according to Du Bois formula of a normal individual of the same age, sex, height and weight.

† Calculated from Aub and Du Bois table according to the age and sex of the individual.

* The temperature of the oxygen is recorded by a thermometer placed inside the spirometer through an opening at the bottom.

the saliva which invariably accumulates in the mouth. If this is neglected the subject may sometimes find it uncomfortable and may become choked. It should be clearly explained to the subject that there is no pain or discomfort whatsoever accompanying the test.

Adjustment of the apparatus

The apparatus should be placed on a table a little higher than the bed of the subject. The space between the walls of the cylinder is filled with water to within one or two inches from the top. The oxygen bell is pushed down to its lowest level. Oxygen gas is then slowly introduced into the spirometer from an oxygen cylinder by connecting it with the petcock of the spirometer. As the gas passes into the spirometer the oxygen bell rises up and carries with it the pen attached to the kymograph thus indicating on the chart the level of oxygen volume. To prevent any escape of gas, the metal mouthpiece connector is closed by a rubber stopper and tests for leakage are also made.

The rubber mouthpiece properly sterilized is fitted into the subject's mouth so that the flange of the mouthpiece fits snugly inside the mouth in the space between the lips and gums and no air leaks through the corners of the mouth. The two projections are meant for giving a thorough grip on the mouthpiece, the subject being advised to bite on them. The nostrils are closed by means of the rubber nose-clips which can be tightened or loosened at will. The nose-clip should be adjusted in such a way that the alæ nasi are firmly gripped so as to prevent any leakage through the nose, without causing any discomfort to the subject.

The subject is then connected with the spirometer. Test for leakage is very carefully made by holding a cooled mirror in and about the nose and mouth. In case of leakage the mirror will get fogged. The subject breathes in and out of the spirometer and when the breathing is steady, the kymograph is set in action. The temperature of the gas inside the spirometer is noted by means of the thermometer fitted at the bottom. The barometric pressure is also recorded. The pulse, the respiratory rate as well as the temperature of the subject is noted before and during the test.

As the subject consumes oxygen from the spirometer during the test, the level of the oxygen bell will gradually get lower and lower carrying along with it the writing pen on the kymograph. At the end of eight minutes when the kymograph cylinder has made one complete revolution it is stopped and the mouthpiece and nose-clip are taken off the subject. The height and weight of the subject is taken immediately after the test. The chart attached on to the kymograph cylinder is then removed. A slope line is drawn across the top, showing the average

respiration heights. This line should represent a fair average and should cover the maximum numbers of the respiratory peaks. Readings of the slope line at the beginning and end of eight minutes are taken. The difference is the consumption of the volume of oxygen per minute in cubic centimetres. The volume is then corrected for temperature and pressure and this represents the corrected actual consumption of the subject. The normal oxygen consumption of the subject per minute is then ascertained from tables according to his height and weight, and corrected for age and sex. The basal metabolic rate is then calculated by dividing the amount above or below the normal by the normal and multiplying by 100.

Basal metabolic rate in normal healthy Indians

In finding out a normal standard for healthy normal Indians, the question naturally arose whether they should conform to or materially differ from the standard laid down for the American and the European subjects, owing to climatic and dietetic variations. In order to find this out and to make our own standard for comparison we selected a fairly large and varied group of healthy normal Indian adults—both male and female—living mostly on a mixed diet, and carried out the experiments on them. The results are given in tables I and II, the former comprising the results obtained in healthy Indian males and the latter in healthy Indian females.

An analysis of the above tables (I and II) reveals the fact that the basal metabolic rate in the majority of the cases (about 75 per cent, both in males and females) was either identical with the American standard or varied only within ± 3 per cent; in the rest of the cases the margin of difference was only slightly greater, but in no case was the variation from the standard greater than ± 5 per cent. Thus, for all practical purposes, readings within ± 5 of the standard may be considered as normal.

The results of our experiments (as shown in tables I and II) thus definitely show that the basal metabolic rate of healthy normal Indians, males and females, does not differ materially from that of Europeans and Americans.

It should be stated that the question of whether the basal metabolic rate of Indian subjects differs materially from that of Europeans or Americans has been the subject of controversy for a long time. Mukherjee (1926), experimenting on 15 Bengali medical students, found that the basal metabolic rate was on an average 9 per cent lower than the European standard. Sokhey (1927) found that, in 15 out of 21 subjects examined, the basal metabolic rate was 10 to 23 per cent lower than the Du Bois standards though at the time of communication his experiments were still proceeding. Krishnan and Vareed (1932), working in Madras, found that the basal metabolic rate was 12 per cent lower in men and 16 per cent in women as compared to Du Bois standard. All the above experiments were done by gasometric methods.

TABLE I
Basal metabolic rate of healthy normal-Indian subjects (male) on mixed diet

Serial number	Age	Height in inches	Weight in pounds	CONSUMPTION OF OXYGEN IN C.C.M. PER MINUTE		Basal metabolic rate
				Actual	Normal	
1	15	60	106	223	211	+ 5
2	18	61	112	216	211	+ 2
3	19	67	110	214	213	0
4	20	61	101	191	191	0
5	22	61	89	188	189	0
6	22	65	88	187	184	+ 1
7	22	64	100	195	198	- 2
8	23	65	113	205	210	- 3
9	24	61	148	230	230	0
10	24	69	113	212	211	0
11	28	67	130	226	228	0
12	29	66	118	210	214	- 2
13	29	68	120	230	222	+ 3
14	30	62	90	173	170	- 4
15	32	66	120	210	213	- 2
16	34	68	161	265	258	+ 2
17	35	66	110	200	200	0
18	38	68	120	215	218	- 2
19	40	66	80	180	178	+ 1
20	42	68	150	232	242	- 5
21	44	66	187	269	255	+ 5
22	45	64	117	196	195	0
23	45	62	112	195	195	0
24	45	69	172	256	258	0
25	46	65	110	196	197	0
26	48	66	154	225	233	- 4
27	50	66	108	192	201	- 5
28	55	68	120	201	208	- 4
29	59	67	89	170	178	- 5
30	72	65	107	180	184	- 3

TABLE II
Basal metabolic rate of healthy normal Indian subjects (female) on mixed diet

Serial number	Age	Height in inches	Weight in pounds	CONSUMPTION OF OXYGEN IN C.C.M. PER MINUTE		Basal metabolic rate
				Actual	Normal	
1	15	56	75	169	164	+ 3
2	16	65	97	202	202	0
3	17	60	96	183	179	+ 2
4	20	61	101	190	182	+ 4
5	22	62	80	164	170	- 4
6	23	58	80	161	161	0
7	24	57	88	162	168	- 4
8	26	62	140	208	206	+ 1
9	26	67	146	226	224	+ 2
10	27	60	86	174	166	+ 4
11	28	57	80	160	161	0
12	29	61	95	169	177	- 5
13	29	64	93	180	177	+ 1
14	30	60	79	159	163	- 4
15	30	63	102	184	185	0
16	30	59	120	189	191	- 2
17	32	62	112	186	187	0
18	34	58	112	178	179	0
19	34	60	130	190	193	- 2
20	37	59	99	168	173	- 3
21	38	62	111	200	189	+ 5
22	38	63	112	196	191	+ 2
23	39	64	183	229	237	- 4
24	40	60	113	176	184	- 5
25	45	65	121	198	195	+ 1
26	46	60	98	169	170	- 1
27	50	64	110	180	185	- 3
28	50	62	93	170	170	0
29	50	57	86	155	156	0
30	55	61	110	170	175	- 3

It is however difficult to believe that such a fundamental thing as basal metabolism should be affected by climate to any great extent any more than the body temperature.

Professor Eijkman (1896) made some experiments with Zuntz respiration apparatus at Batavia in Java and found that the basal heat production in the tropics was the same as in the temperate zone.

Eijkman (1921) in the Dutch Indies also found that there was no difference in the basal metabolic rate between people living in Europe and the native inhabitants there. The number of experiments done by Professor Eijkman are so large that individual differences or idiosyncrasies of the subjects may be ruled out.

Knipping as the result of his observations in Java, Sumatra and other islands of the Dutch East Indies found a decrease of metabolism by 2.5 per cent only as compared to the predilection standard of Benedict. Turner (1926) found no marked difference in basal metabolism depending upon the racial factor.

Hideo Takahira (1925) experimenting on a large group of Chinese and Japanese subjects found no essential difference in the basal metabolism as compared to Europeans and Americans. The findings of Okada, Sakura and Kameda (1926) also agree with those of American standards.

Taking a general review of the whole problem it appears that the observations of the majority of workers who have studied metabolism in the tropics are in agreement with those of the present writers, viz, that there is no essential difference in the basal heat production in people whether living in the tropics or in the cold or temperate zones. Most of the workers are also agreed that the nature of the diet had but little influence on the basal metabolism unless of course it (more particularly the protein content) underwent extreme variations.

The senior author has been making clinical experiments with the various modifications of the Sanborn apparatus off and on for the last 12 years and the results of his experiments clearly show that the basal metabolic rate of healthy normal Indians, living mostly on a mixed diet, does not differ materially from the European and the American standard and this has been taken as a basis for clinical investigation into certain diseased conditions.

Basal metabolism in diseases of the thyroid gland

The determination of the basal metabolic rate is perhaps of the greatest diagnostic value in diseases of the thyroid gland, the severity of which often runs parallel with basal metabolic rate.

The earliest study of metabolism in diseases of the thyroid gland was made in Germany by Friedrich Muller (1893). Magnus-Levy (1895) definitely demonstrated the increased rate of oxygen consumption in hyperthyroid conditions, sometimes going up to 70 per cent above the normal. As a matter of fact he with Du Bois clearly showed that the measurement of the basal metabolic rate in thyroid diseases gives us a very valuable help in gauging the effect of treatment. Boothby and Plummer have used changes in basal metabolism as the chief basis for the classification of the diseases of the thyroid gland. Means and Aub

(1919) made 2,019 metabolic observations on 1,000 cases and came to the following very important conclusions:

- (1) that patients suffering from hyperthyroidism invariably show increased metabolic rate and those with hypothyroidism show decreased metabolic rate;
- (2) that those patients with goitre but no signs and symptoms of abnormal thyroid function show normal basal metabolic rate;
- (3) that, excluding certain well-recognized causes of increased and decreased metabolism, an increase in the basal metabolic rate is strong presumptive evidence of hyperthyroidism and a low metabolic rate is evidence of hypothyroidism.

The increase of the basal metabolic rate in conditions of hyperthyroidism is believed to be due to thyroxin, the active principle of the thyroid secretion. Thyroxin is a remarkably active substance, which is thought to act as a catalyst and to accelerate the potential energy in the tissues and the cells of the organs. According to Lusk a milligramme of thyroxin may cause an increase in heat production equal to the oxidation of 267 grammes of glucose. This, of course, accounts for the rapid rise in the basal metabolic rate following the administration of thyroxin or the thyroid extract. This will be further discussed later on.

Even a casual analysis of tables III and IV will bring out a few outstanding facts:

(1) In table III, which comprises cases of enlarged thyroid without clinical signs and symptoms of hyperthyroidism, the basal metabolic rate in most of the cases was either within normal limits or only slightly above it. In three cases only the results were definitely higher than normal and these were thought to be border-line cases. These cases were asked to report themselves periodically. Only one of them (case 6, table III) has since developed the clinical signs and symptoms of hyperthyroidism of a mild type; the basal metabolic rate done at this stage was found to be moderately high (case 5, table IV).

(2) In table IV the results are very striking. All the cases showed either moderate or marked increase in the basal metabolic rate. In one case (case 10) with marked exophthalmos and other clinical signs and symptoms of marked hyperthyroidism the basal metabolic rate was remarkably high and went up to the figure of +90 per cent.

The estimation of the basal metabolic rate, therefore, enables us to draw a line of distinction between goitre with associated hyperthyroidism and without it, thus giving us a valuable hint as to the line of treatment to be adopted in individual cases.

Basal metabolism in dysfunction of endocrine glands other than the thyroid

The consensus of the present-day opinion is that the thyroid gland plays the principal part in keeping the metabolism within normal limits. The adrenals and the pituitary are also believed to take some part in influencing the basal metabolism in man but the disturbances caused by these glands have not been found to produce uniform and comparable changes in the basal

TABLE III

Basal metabolic rate of enlarged thyroid cases without any clinical signs and symptoms of hyperthyroidism

Serial number	Sex	Age	Height in inches	Weight in pounds	CONSUMPTION OF OXYGEN IN C.C.M. PER MINUTE		Basal metabolic rate
					Actual	Normal	
1	Male	21	71	112	232	212	+ 9
2	"	29	68	121	235	216	+ 8
3	"	30	66	140	230	210	+ 9
4	"	30	63	81	197	172	+ 14
5	"	40	66	89	190	178	+ 6
6	"	30	65	135	260	224	+ 16
7	"	47	66	142	270	233	+ 15
8	"	50	63	145	238	218	+ 9
9	Female	25	60	80	168	160	+ 5
10	"	34	62	109	200	187	+ 6
11	"	39	61	187	234	222	+ 2
12	"	41	62	120	187	190	- 2
13	"	42	64	163	232	222	+ 5
14	"	45	61	160	206	207	0
15	"	48	66	163	223	219	+ 1

TABLE IV

Basal metabolic rate of enlarged thyroid cases with distinct clinical signs and symptoms of hyperthyroidism

Serial number	Sex	Age	Height in inches	Weight in pounds	CONSUMPTION OF OXYGEN IN C.C.M. PER MINUTE		Basal metabolic rate
					Actual	Normal	
1	Male	19	67	132	310	236	+ 31
2	"	24	65	117	274	202	+ 35
3	"	25	70	121	340	229	+ 48
4	"	26	64	100	253	191	+ 32
5	"	30	65	135	293	224	+ 30
6	"	35	64	79	248	174	+ 40
7	"	40	66	89	216	178	+ 21
8	"	45	69	117	299	212	+ 41
9	"	45	62	100	255	188	+ 40
10	Female	22	64	100	365	189	+ 93
11	"	33	63	114	289	186	+ 55
12	"	35	60	112	280	188	+ 48
13	"	35	63	113	312	186	+ 67
14	"	44	60	134	251	192	+ 30
15	"	50	59	117	247	177	+ 39

metabolic rate. Adrenalin has been found to increase the metabolic rate but to a much less extent than thyroxin. The injection of one milligramme of adrenalin in man increases the heat production by about 20 per cent for a short period only; clinical states of hyperadrenalism observed during stages of growth of tumours of the adrenal gland, such as hypernephroma, may be associated with an increase in the basal metabolic rate, but it is difficult to state how much this action is due to the adrenals and how much is due to the associated hyperaction of the thyroid gland due to adrenalin stimulation.

The same is true of the raised metabolic rate obtained in certain cases of pituitary hyperaction as in the early stages of acromegaly.

It is not the object of this paper to go into details as regards the exact interrelationship between the various endocrine glands. It will be enough to say that there is a close interrelationship between the action of the thyroid gland and those of the adrenals, pituitary and the gonads. Removal of the thyroid gland has been found to cause an associated marked depression of the adrenal activity (Bose, 1930). Similar changes also take place in the pituitary and the gonads. The close relationship between the thyroid and the sex glands are also proved by the fact that the thyroid becomes more active and sometimes enlarged during puberty, during menstruation and during pregnancy, and in thyroidectomized animals the sex glands fail to develop.

The literature concerning the effect of the hyperaction or underaction of the adrenals and the pituitary in causing a raised or lowered basal metabolic rate is contradictory and confusing. Most observers seem to think that the apparent influence of these glands on the basal metabolic rate, as observed in certain groups

of cases, is brought about through the medium of the thyroid, which is believed to be the principal factor in controlling metabolism. Owing to the close inter-relationship between these endocrine glands, any disturbance of either the adrenals or the pituitary is reflected on to the thyroid. The somewhat high basal metabolic rate sometimes obtained in the early states of acromegaly and in certain clinical states of hyperadrenia is explained by an associated increase in the thyroid activity brought about by the stimulation of the thyroid by the hyperaction of these glands. The lowered rate of metabolism observed in certain cases of hypopituitarism (such as Fröhlich's syndrome or dystrophia adiposo genitalis), or of hypoadrenia (such as Addison's disease) is thought to be due to the same cause, *e.g.*, associated depression of the thyroid function.

Aub and McKinlay believe that the influence of the diseases of the pituitary gland on the basal metabolism is always brought about through the medium of the thyroid gland. Du Bois's view that there is no uniformity of the basal metabolic rate in the diseases of the pituitary gland is also based on the same theory.

In view of the above statements it seems reasonable for us to assume that diseases which uniformly cause a high basal metabolic rate

may be taken to indicate clinically a condition due to the hyperaction of the thyroid gland, and similarly those which persistently cause a low basal metabolic rate would indicate a condition due to underaction of the thyroid gland. The oral administration of thyroid preparation or thyroxin to the latter group of cases, causing a rise in the basal metabolic rate with the simultaneous improvement in the clinical condition, would certainly be taken as additional evidence in favour of hypothyroidism being the cause of the clinical condition. This is clearly shown in table VI. The markedly low basal metabolic rate in the three cases of ichthyosis hystrix and the fairly rapid rise of the rate after administration of thyroid preparations, with the complete and rapid disappearance of the skin condition, is strongly in favour of the theory that hypothyroidism plays the most important part in the ætiology of this group of skin diseases (*see* tables V and Va). All the cases of ichthyosis and scleroderma were treated on similar lines with excellent results, but the

TABLE V

Basal metabolic rate in cases of ichthyosis

Serial number	Sex	Age	Height in inches	Weight in pounds	CONSUMPTION OF OXYGEN IN C.C.M. PER MINUTE		Basal metabolic rate
					Actual	Normal	
1	Male	8	47	65	121	173	—30
2	"	14	58	74	128	181	—30
3	"	16	62	86	124	191	—36
4	"	19	56	67	140	160	—12
5	"	20	64	97	148	187	—21
6	"	20	65	95	140	195	—29
7	"	22	67	101	152	196	—23
8	"	30	65	102	159	192	—18
9	"	30	64	106	148	202	—26
10	"	30	62	112	160	200	—20
11	"	33	69	115	162	219	—27
12	"	34	65	106	151	196	—23
13	"	35	65	127	149	210	—30
14	"	45	65	106	151	196	—23
15	"	64	63	138	125	197	—37
16	Female	21	59	108	158	185	—15
17	"	35	62	222	190	234	—22
18	"	35	61	118	147	191	—24

TABLE Va

Basal metabolic rate in cases of scleroderma

Serial number	Sex	Age	Height in inches	Weight in pounds	CONSUMPTION OF OXYGEN IN C.C.M. PER MINUTE		Basal metabolic rate
					Actual	Normal	
1	Male	18	63	88	149	203	—26
2	"	28	65	101	168	200	—16
3	"	34	66	120	169	213	—21
4	Female	27	63	115	133	196	—32
5	"	45	62	100	137	177	—22

TABLE VI
Basal metabolic rate in three cases of ichthyosis before and after treatment

Serial number	Sex	Age	Height in inches	Weight in pounds	CONSUMPTION OF OXYGEN IN C.C.M. PER MINUTE		BASAL METABOLIC RATE	
					Actual	Normal	Before treatment	After treatment
1	Male	16	62	86	124	191	— 36	— 4
		16	62	86	183	191		
2	"	20	64	97	148	187	— 21	+ 5
		20	64	97	198	187		
3	Female	35	62	222	190	243	— 22	+ 23
		35	62	213	297	238		

reason why only three cases have been included in table VI is because the results in those cases have been most striking. The determination of the basal metabolic rate in diseases of the skin, more particularly in ichthyosis and scleroderma, and the administration of thyroid in suitable doses (having regard to the basal metabolic rate) has become a standard and scientific method of treatment at the present day. This

is also corroborated by the studies of Krogh and With in 1923 on the influence of ichthyosis on basal metabolism; also of Hinser and Sehmed in 1904.

It should be mentioned here that some cases of scleroderma, particularly those of tylosis, do not improve permanently and a complete recovery is seldom possible. The reason for this is that the lesion being of long standing had

TABLE VII
Basal metabolic rate in cases of psoriasis

Serial number	Sex	Age	Height in inches	Weight in pounds	CONSUMPTION OF OXYGEN IN C.C.M. PER MINUTE		Basal metabolic rate
					Actual	Normal	
1	Male	15	60	89	189	196	— 8
2	"	15	66	100	195	210	— 7
3	"	20	61	89	165	174	— 6
4	"	23	58	80	154	151	+ 2
5	"	26	66	96	179	191	— 7
6	"	26	69	124	212	219	— 4
7	"	31	70	113	196	209	— 6
8	"	32	65	108	183	196	— 7
9	"	37	68	154	222	236	— 6
10	"	40	66	150	216	230	— 6
11	"	42	72	112	179	212	— 8
12	"	53	69	150	221	231	— 4
13	"	55	68	145	202	221	— 9
14	"	72	65	107	188	182	+ 3
15	Female	13	59	110	189	200	— 6

TABLE VIII
Basal metabolic rate in cases of pityriasis rubra

Serial number	Sex	Age	Height in inches	Weight in pounds	CONSUMPTION OF OXYGEN IN C.C.M. PER MINUTE		Basal metabolic rate
					Actual	Normal	
1	Male	16	65	97	202	193	+ 4
2	"	30	63	97	200	190	+ 5
3	"	35	65	103	188	192	— 3
4	"	50	66	101	191	191	0
5	"	55	69	190	265	262	+ 1
6	Female	16	60	79	159	166	— 5
7	"	40	60	103	172	172	0
8	"	43	61	138	193	199	+ 3
9	"	52	63	150	198	203	— 3
10	"	54	60	135	194	188	+ 3

TABLE IX
Basal metabolic rate in cases of leucoderma

Serial number	Sex	Age	Height in inches	Weight in pounds	CONSUMPTION OF OXYGEN IN C.C.M. PER MINUTE		Basal metabolic rate
					Actual	Normal	
1	Male	18	58	74	165	168	- 2
2	"	21	65	96	178	196	- 5
3	"	25	63	106	195	200	+ 3
4	"	30	73	136	262	248	+ 5
5	"	32	66	81	172	180	- 5
6	"	41	67	141	230	227	+ 1
7	Female	25	61	79	171	170	0
8	"	33	61	100	192	186	+ 3
9	"	35	60	88	170	180	- 6
10	"	38	57	114	190	180	+ 5

already led to the formation of scar tissues in the deeper portions of the skin and caused permanent damage. If these cases had been tackled earlier, the results would probably have been different.

Diseases of the skin giving either normal or varying basal metabolic rates

The above tables comprise a varied group of skin conditions—including psoriasis, pityriasis rubra and leucoderma. In most of these cases the basal metabolic rate is more or less within normal limits except a few which give borderline figures. It seems reasonable to conclude that endocrine imbalance does not play any important part in the ætiology of the above conditions. As a matter of fact, the consensus of the present-day opinion on the ætiology of these groups of cases is that the endocrine imbalance is more apparent than real—the principal cause being either a septic focus or an allergic condition due to a faulty metabolism.

Metabolism in diabetes

The consensus of opinion among the various workers on the subject appears to be that in mild cases of diabetes the metabolic rate varies but little from the normal, but in severe cases it sometimes shows great variations. This appears to be mainly due to either severe dietetic restrictions or to acidosis. Hedon (1927) has noted that the metabolic rate is markedly increased in severe diabetes with acidosis, the chief causes, according to him, being the diet which is extremely poor in carbohydrates but liberal in protein and fat.

Joslin has recently very carefully compared the data of metabolism in diabetes in the two principal eras of diabetic treatment, namely the period before 1914, which is known as the Naunyn era of treatment in which the patient used to be overfed, being put on a low carbohydrate and high protein-fat diet, and after 1914, which is known as the Allen era of treatment in which the patient used to be severely underfed. By analysis of figures in these two periods of treatment, Joslin has come to the conclusion that the average variations in result in these two periods is about the same, i.e.,

whereas the average result in the former period (Naunyn era) was +12 per cent, the same in the latter period (Allen era) was -11 per cent. Thus the comparative constant deviation from the normal zone (which appears to be entirely due to dietetic factors) led him to the conclusion that the metabolism in diabetes, even of a severe type, varies but little from the normal.

As early as 1905, Magnus-Levy was the first investigator to assume that metabolism was increased in diabetes. This assumption was supported by other workers including Benedict and Joslin (1912). Allen and Du Bois (1916) however very carefully tabulated their results and compared them with those of Magnus-Levy, Mohr and Benedict and concluded that the increase of the basal metabolism above the true normal result was generally absent or slight in diabetes.

In 1917 Fatta, who did a large amount of experimental work in metabolism in diabetes, took the view that the apparent increase in the metabolism in diabetes, as found by some of the other workers, could be ascribed to the rich protein-fat and high caloric diet and had probably very little to do with the disease itself. His own opinion was that the increased metabolism was not the rule in diabetes but an exception, and was only found in cases where severe acidosis and a low respiratory quotient exists; on the other hand, marked decrease in metabolism was found only in those cases where there was severe under-nutrition and thus it could be ascribed to the chronic reduction of the food intake and the consequent reduction of oxidation that naturally follows. Wilder, Boothby and Beeler (*Jour. Biol. Chem.*, 1922, 51, 311) after having carefully studied the basal metabolic rate in 31 cases of diabetes and having reviewed the available observations of the other workers could find but few deviations of the basal metabolic rate in uncomplicated diabetes from the normal Du Bois standards.

In the following table, the results of basal metabolism test on 25 cases of Indian diabetes of various grades of severity are given. All the patients were on a balanced diet and all except one (case 24) were free from acidosis; this case however was suffering from a mild grade of acidosis.

It will be evident from the table that the basal metabolic rate in the majority of the cases was within normal limits (± 5 per cent); only in one case (case 24) is slight increase in the rate noticed and this patient, as has already been said, was suffering from slight acidosis.

TABLE X
Basal metabolic rate in cases of diabetes

Serial number	Sex	Age	Height in inches	Weight in pounds	CONSUMPTION OF OXYGEN IN C.C.M. PER MINUTE		Basal metabolic rate
					Actual	Normal	
1	Male	32	63	118	196	206	— 6
2	"	35	67	106	268	252	+ 6
3	"	36	68	160	245	252	— 2
4	"	38	66	102	208	198	+ 5
5	"	39	67	132	230	225	+ 2
6	"	40	69	154	243	252	— 4
7	"	42	71	116	225	216	+ 3
8	"	43	65	147	225	228	— 2
9	"	45	62	104	176	184	— 4
10	"	47	61	120	200	197	+ 1
11	"	47	62	126	212	203	+ 4
12	"	49	68	140	228	230	— 1
13	"	49	72	280	340	330	+ 3
14	"	51	66	130	189	210	— 6
15	"	51	67	148	228	231	— 2
16	"	52	69	120	207	216	— 5
17	"	54	71	145	252	239	+ 5
18	"	56	65	130	205	210	— 3
19	"	59	68	138	213	222	— 4
20	"	60	68	145	223	229	— 3
21	"	68	65	135	196	208	— 7
22	Female	30	62	122	187	195	— 5
23	"	35	63	267	260	270	— 4
24	"	40	70	101	224	200	+ 12
25	"	45	58	116	170	178	— 5

In view of our observations and those of others, it seems quite reasonable for us to conclude that the basal metabolic rate in conditions of diabetes is within normal limits. Any changes in the metabolic rate, either on the high or low side, can be attributed to the nature of the diet, nutrition, and the complications of the case, and has very little to do with the diabetic condition itself.

Summary and conclusions

It must be admitted that even perfectly healthy individuals are so unlike one another that it is impossible to conceive of a fixed normal point as a standard of metabolism. The normal standard, therefore, should be considered to be in a zone with a certain latitude rather than at one fixed point. How wide this zone should be and whether it would vary with the race and the climate has been a matter of much difference of opinion.

The authors have determined the basal metabolic rate in normal and diseased conditions in Indian subjects extending over the last few years and have come to the following main conclusions :—

(1) The basal metabolic rate of healthy normal Indians, males and females, living on a mixed diet does not essentially differ from that of the European and American standards;

(2) A basal metabolic rate within ± 5 per cent of the normal standard should be considered as normal;

(3) The estimation of basal metabolic rate enables us to draw a line of distinction between two types of goitre, namely those with associated hyperthyroidism and those without it, thus giving us valuable help as to the line of treatment to be adopted in individual cases;

(4) The estimation of basal metabolic rate is specially valuable in certain groups of skin diseases more particularly ichthyosis and scleroderma; the results of the authors' experiments clearly showing that hypothyroidism plays a very important part in the aetiology of this group of cases and that administration of thyroid in suitable doses (as determined by the basal metabolic rate) is effective in raising the basal metabolic rate with the simultaneous marked improvement in the clinical condition;

(5) In certain other skin diseases, such as psoriasis, pityriasis rubra, and leucoderma, the basal metabolic rate is within normal limits; and

(6) In diabetes mellitus the basal metabolic rate is within normal limits, the variations in the metabolic rate as sometimes noted being due to the state of the nutrition of the patient and the complications of the disease and having very little to do with the diabetic condition itself.

REFERENCES

Allen, F. M., and Du Bois, E. F. (1916). *Arch. Intern. Med.*, Vol. XVII, p. 1010.

(Continued at foot of next page)

FURTHER OBSERVATIONS ON THE TREATMENT OF ORIENTAL SORE*

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THREE years ago I published a paper (Warma, 1931) in the *Indian Medical Gazette* on the treatment of oriental sore. In the same number the editor summarized the position regarding the treatment of this condition and indicated certain aspects of the subject that would repay investigation.

A further study of the subject was undertaken with a view to elucidating the various points raised in this editorial.

Treatment with berberine sulphate

Solutions of the salt were made with boiled distilled water in two strengths, namely one per cent and two per cent. It was found on experience that the solutions could be stocked in dark stoppered bottles for at least a week without being spoilt in any way. The solutions were, however, boiled in a spoon over a flame each time before use.

The comparative value of the one and two per cent solutions was tested by giving injections into similar types of sore occurring in different individuals. A series of 100 sores occurring in 78 patients was recorded for the purpose, 50 sores getting treatment with each of the two strengths of the solution. Scrapings from the sores were first examined for the presence of leishmania, and, for the purpose of these investigations, treatment was given only in those cases in which the diagnosis was positive.

* Being a résumé (prepared by the editor) of a paper read at a meeting of the British Medical Association, Punjab Branch, on 3rd January, 1934, at Lahore.

(Continued from previous page)

- Benedict, F. G., and Joslin, E. P. (1912). *Carnegie Institute of Washington*, No. 176.
 Bose, J. P. (1930). *Indian Journ. Med. Res.*, Vol. XVIII, p. 227.
 Eijkman, C. (1896). *Pflüger's Arch. ges. Physiol.*, Vol. LXIV, p. 57.
 Eijkman, C. (1921). *Journ. de Physiol. et de Path. Gen.*, Vol. XIX, p. 33.
 Hedon, L. (1927). *Paris Méd.*, Vol. LXIII, p. 446.
 Krishnan, B. T., and Vareed, C. (1932). *Indian Journ. Med. Res.*, Vol. XIX, p. 831.
 Magnus-Levy (1895). *Berl. Klin. Woch.*, Vol. XXXII, p. 650.
 Means, J. H., and Aub, J. C. (1919). *Arch. Intern. Med.*, Vol. XXIV, p. 404.
 Mukherjee, H. N. (1926). *Journ. Amer. Med. Assoc.*, Vol. LXXXVI, p. 1384.
 Muller, F. (1893). *Deut. Arch. Klin. Med.*, Vol. LI, p. 335.
 Okada, S., Sakura, E., and Kameda, T. (1926). *Arch. Intern. Med.*, Vol. XXXVIII, p. 590.
 Sokhey, S. S. (1927). *Trans. 7th Congress, Far Eastern Assoc. Trop. Med.*, Vol. III, p. 321.
 Takahira, H. (1925). *Report, Metabolic Laboratory, Imperial Government Institute for Nutrition, Tokyo.*
 Turner, E. L. (1926). *Journ. Amer. Med. Assoc.*, Vol. LXXXVII, p. 2052.

Sores of types* I, II and III were given the injections straight away, while sores of type IV were first treated with antiseptic dressings till they became free from sepsis, and, as their condition after this resembled that of the sores of type III, they were classed with the latter. During the course of the treatment by this method, the sores were not treated with any ointment or other local applications, but a hot boric compress was invariably prescribed, to be continued during the intervals between the injections. The injections were given at intervals of a week.

The method of injection has been described previously. Three or more pricks were made each time into the skin with a fine needle fixed on to an all-glass syringe.

The following two tables summarize the results obtained by treating 50 sores each with the one and two per cent solutions of berberine sulphate, respectively:—

TABLE I

Fifty sores treated by berberine sulphate—one per cent solution; grouped according to type and number of injections required

Type of sore	Number of injections needed to effect a cure							
	1	2	3	4	5	6	7	8
I	2	5	2	1	..	..	..	..
II	..	..	5	5	8	1	1	..
III	..	..	4	9	6	1	..	..

TABLE II

Fifty sores treated by berberine sulphate—two per cent solution; grouped according to type and number of injections required

Type of sore	Number of injections needed to effect a cure							
	1	2	3	4	5	6	7	8
I	2	6	1	1	..	..	..	..
II	..	2	8	5	3	2	..	..
III	..	..	..	3	5	9	2	1

*Type I.—Consisting of a small red nodule covered with a reddish-brown scale.

Type II.—A localized raised area of inflamed tissues covered with a crust, whose surface is cracked or fissured in places, with a serous discharge exuding from it, and the whole mass surrounded by a ring of induration. There is no actual ulceration of the surface of the sore.

Type III.—A raised ulcerating localized area surrounded by a hard indurated red periphery, having a non-purulent serous discharge.

Type IV.—A raised septic ulcer discharging pus, or covered with slough, surrounded by a hard brown indurated periphery.

The results stated above and the observations made during the treatment established the following points:—

There was no difference in time taken by sores of type I to heal, whether treated with a one per cent or a two per cent solution. Ten sores of this type were treated with each solution. The maximum number of injections required in each case was four and the minimum one; and the largest number of sores healed after the second injection in both cases.

In the treatment of sores of type I, therefore, it is quite sufficient to use a solution of one per cent strength.

It was noticed that, with regard to the amount of inflammation and the severity of pain caused by the two solutions in this type of sore, there was slightly greater inflammation caused locally by the two per cent solution than by the one per cent solution, but there was no difference in the severity of the pain felt by the patients as a result of injections with either of the solutions. In fact they did not complain of much pain beyond that attributable to the pricks of the needle.

The sores of type II responded slightly differently to treatment with the two solutions. Twenty sores of this type were treated with each solution. It was found that the two per cent solution gave a better result, especially in such cases where there was an overgrowth of the tissues of the sore due to its very long duration.

With regard to pain and inflammation in this type of sores, it was observed that there was no difference in the result of injections with the two solutions. The patients in this case also did not complain of pain resulting from the injections with either of the solutions.

Sores of type III also behaved differently towards treatment with the two solutions. Twenty sores of this type were treated with each solution. It was noticed that the two per cent solution gave rise to a good deal of inflammation and pain after injection, while the one per cent solution was tolerated easily. The healing was quicker with the one per cent solution than with the two per cent.

The relation between the healing of the sores and the disappearance of the specific infection locally was also investigated in the above cases, while the treatment was in progress. For this purpose, the scrapings and the exudates from the sores were re-examined each week before giving fresh injections. It was found that the healing of the sores was always delayed beyond the period at which organisms disappeared from the local site. The minimum delay that occurred was in sores of type I; and was from a week to 18 days. The maximum delay occurred in sores of type III and ranged between a fortnight to 26 days.

Reference has already been made to the pain caused by injections with berberine sulphate solutions. Injections with one per cent solution

did not produce pain in any case. Injections with two per cent solution produced pain only in cases having sores of type III, and no pain in any other case. As it is no longer considered advisable to treat sores of type III with a two per cent solution, the problem of pain in this form of treatment does not need any serious consideration. The application of a local anaesthetic prior to the injections with berberine sulphate solution is not, therefore, indicated.

Toleration and dosage

The question of the total quantity of berberine sulphate that it would be safe to administer at one time to an adult male was investigated. Tests were carried out by giving injections with gradually increasing quantities of a one per cent solution of berberine sulphate to adult male patients suffering from multiple sores. To begin with a total of 2 c.cm. of a one per cent solution equivalent to a third of a grain of the salt was injected by infiltrating two or more sores at one time. The effect of this on the patient was observed by keeping him under observation for 24 to 48 hours, and, if no ill effects were complained of by the patient, the quantity was increased by 0.5 c.cm. This procedure was repeated each week until definite feelings out of the normal were complained of by the patient. These tests were applied on 10 patients. It was found that 2 of these patients complained of feelings of dullness and heaviness in the head and a general disinclination to work with dryness of the mouth on the day of receiving the injection of 4 c.cm. of the one per cent solution (equivalent to two-thirds of a grain of the salt) which lasted for less than 24 hours. Another 5 patients complained of similar feelings when they received an injection of 4.5 c.cm. of the one per cent solution (equivalent to three-quarters of a grain of the salt). The remaining 3 patients complained of severer symptoms in the way of severe headache, vomiting, dryness of mouth, etc., lasting for a day and a half, on having received a dose of 5 c.cm. of the one per cent solution (equivalent to five-sixths of a grain of the salt), although they had not complained of any trouble on receiving the previous dose of 4.5 c.cm. of the one per cent solution. The total quantity of 4 c.cm. of a one per cent solution of berberine sulphate (equivalent to two-thirds of a grain of the salt) seems, therefore, the safe limit which an otherwise healthy male adult will stand without feeling any toxic effects.

Treatment with preparations of antimony

Those who have to treat cases of oriental sore realize that there are quite a number of cases in which it is not possible to use berberine sulphate. These are, firstly, cases with sores on the eyelids, nose, lips, forehead, etc., where injections cannot be given, and, secondly, cases

with multiple sores, where, apart from the objection of the number of pricks necessary for complete infiltration of all the sores, there is the danger of administering a toxic quantity of the drug.

In view of these difficulties, other methods of treatment have to be employed. For cases of sores on the face, one has no choice at present except to use carbon dioxide snow applications; and yet one knows that extensive scarring with consequent disfigurement results from it. For cases of multiple sores, treatment by intravenous or intramuscular injections of some drug suggests itself; and the choice lies in using tartar emetic or one of the other organic preparations of antimony, of which there are many available.

Some time ago, I received a large supply of a new antimony preparation, for trial purposes. The preparation is named *Espundal*, it is a trivalent aromatic compound and is manufactured by Messrs. Schering of Berlin. It is a white powdery substance packed in hermetically-sealed glass ampoules in doses of 0.2 gramme and 0.5 gramme. The firm also supplies sealed ampoules of sterilized physiological salt solution in quantities of 10 c.cm. each, for the purpose of making solutions of *Espundal*. The solution of the preparation was to be administered by intramuscular injection.

The manufacturers' note, forwarding the parcel of the drug, stated that it had been tried on animals in laboratory tests, and also on a few cases of oriental sore in men met with in some places on the Continent. The reports received from these places had been encouraging. The superiority of the preparation over others of the same kind was stated to consist in:—

(a) The easier method of its administration as it was to be given by intramuscular injection, while most of the others had to be given intravenously.

(b) The administration being absolutely painless.

However, the administration was always found to be very painful, so much so that it was with great difficulty that the patients could be induced to continue the treatment. The remedy could be tried only on ten cases. Four cases were given six injections each at weekly intervals receiving three doses of 0.5 gramme each and three of 0.2 gramme each. Of the remaining six patients, one received four, three two, and two only one injection. In none, however, was the result satisfactory, as the sores did not seem to be affected in any way.

Tartar emetic

I tried 15 cases with tartar emetic solution; they had a total of 50 sores on them. All the cases were adults, 12 being males and 3 females.

The treatment consisted in giving intravenous injections of a two per cent solution in sterilized distilled water, at the bend of the elbow. The interval between each injection was 3 days and the successive doses used were 1 c.cm., 2 c.cm., 2.5 c.cm. and 3 c.cm.

Subsequently 3 c.cm. was given at each injection, up to a total of 12 injections. Before starting the injections it was ascertained that the patient was not passing any albumin in his urine. During the course of the injections, if the patient complains of any ill effects, such as diarrhoea, or skin irritation, the treatment should be stopped for a week or more, till symptoms subside, and restarted with smaller doses given at longer intervals. No such accident occurred, however, in my series. The result of the treatment is given in the table below:—

Cured after 3 injections	..	..	1
" " 4 "	..	..	1
" " 6 "	..	..	2
" " 8 "	..	..	2
" " 12 "	..	..	4
Left uncured after 12 injections	..	..	5
TOTAL			15

Out of the 15 cases treated by this method only 10 were cured in 6 weeks after getting 12 injections. This is not a very satisfactory result.

The generalized nature of the reaction produced in the body of oriental sore

It has already been noted that sores treated with berberine sulphate do not heal for at least two to three weeks after the specific infection has disappeared from the local site. On referring to the symptomatology of the disease one learns that, although general constitutional symptoms are not evident in an ordinary case of oriental sore infected in the natural manner, they are always present, in the form of fever, etc., when the sore is produced experimentally—as noted by Wenyon and others; they have also been complained of by patients suffering from multiple sores. It is more than probable that in ordinary cases of oriental sore also there is some general reaction in the body, and the fact that there are no constitutional symptoms, e.g., fever, only means that the general reaction is not severe enough to produce them. Serological tests, such as the complement-fixation test and the agglutination test, used in bacterial infections have been applied in oriental sore, and definite changes have been observed to take place in the serum. It may be asked how these changes are brought about in view of the

fact that oriental sore is localized and that the causal organism does not circulate in the blood. It seems probable that the causal organism, in addition to the destruction of the tissue cells locally at the site of the sore, produces a specific toxin, which in all cases circulates in the blood, and gives rise to a general reaction. Work on the subject has been scanty and is found scattered in various journals, but it has been surveyed by Taliaferro in his book *Immunology of Parasitic Infections*. The fact that a primary infection in oriental sore confers an immunity to a second sore was known to man long before even the discovery of the protozoal nature of the disease. For instance, we read in the history of the disease that the fair damsels of Bagdad and Mosul have long utilized this knowledge by voluntarily getting themselves injected with the material obtained from the sore on some other person, in order to produce the disease on a covered part of their own body, so that they may escape from getting a sore on the face or other exposed parts.

Recent investigations, however, have shown that immunity does not result from the attack of an 'abortive sore', that is to say, a sore which does not run the normal course. Therefore, attempts to produce immunity with vaccine prepared from *Leishmania tropica* have not been successful.

Professor Row of Bombay was the first to suggest (1912) that, as a result of some tests made by him, he believed that a vaccine prepared from *L. tropica* was helpful in hastening the cure of oriental sore although it did not prevent infection.

Attempts have been made by various workers to use serological tests in aid of diagnosis as well as for differentiation of various members of the genus *Leishmania*. The most noteworthy statement came from Noguchi who in 1924 published a paper, in which he stated that the anti-serum of *L. tropica*, recovered from the actively-immunized rabbit, caused a clear-cut agglutination in a dilution of 1 in 80 and in one case in a dilution of 1 in 200 with *L. tropica* only, and did not at all affect the other leishmania species. Later, in 1926, he confirmed this both by using agglutination and complement-fixation tests. He was perhaps the next (after Row) to suggest that, if a suitable culture medium were devised to obtain the growth of *L. tropica* in pure culture and in sufficient quantity, it would be possible to prepare a vaccine for the treatment of oriental sore.

Recently Dr. J. C. Ray has done a good deal of work on the subject—first in Germany and England, later in India. He published a paper in 1929 in the *Archiv für Schiffs- und Tropen-Hygiene*, in which he stated that he had been able to obtain an agglutinating titre to the extent of a dilution of 1 in 2,500—a result

hitherto possible only in the case of bacterial agglutination. It seems to have been definitely established now from the work of Hindle, Hou, and Patton, and of Ray that complement-fixation tests can reliably be used for diagnostic purposes.

Mayer and Ray (1928), and Ray (1932) have been successful in devising a very satisfactory solid medium for the growth of leishmania.

Ray further claims that, by preparing antigens of a suitable dilution from cultures of *L. tropica*, he has been able to devise a specific intracutaneous test for the diagnosis of oriental sore. This test, he says, is also interesting from the point of view of the treatment of the disease with vaccine, for if the reaction is strong it is an indication that the case will be cured rapidly by vaccine treatment. The test consists of taking the requisite antigen and instilling a drop or two of it into the skin in the form of a wheal and noting the reaction after twenty-four and forty-eight hours. If a red raised infiltrated area is formed at the site of inoculation, the reaction is positive.

Treatment with Row's vaccine

Professor Row of Bombay very kindly sent me some vaccine prepared by himself for the treatment of oriental sore. The following procedure was adopted. The sores were first examined for leishmania and treatment was given only to positive cases. 0.5 c.cm. of the vaccine was taken in a sterile hypodermic syringe, and diluted with an equal quantity of sterile normal saline, and injection made into the subcutaneous tissues of the arm of the patient. The case was seen after 24 and 48 hours for evidence of any reaction—general or local—this if present was treated symptomatically on ordinary lines. The injections were repeated twice weekly, ordinarily, but if there had been a severe reaction as a result of any injection the next dose was given after a week. The second and subsequent doses consisted of 1 c.cm. diluted with the same quantity of normal saline.

Results.—Of the cases treated by this method there were some who did not keep up the treatment after one or two injections in each case. There were 25 cases, however, who completed the treatment and in whom the vaccine can be said to have received a full trial. Nine patients (5 cases of multiple sores and 4 cases of single sores) were completely cured without getting any other form of treatment—general or local, except a simple surgical dressing to keep the sores covered. Thirteen patients showed a definite improvement in the beginning, but no further change was noticed after the third or fourth dose of the vaccine. Three did not evince any improvement at all.

Treatment with Ray's vaccine

Meanwhile Dr. Ray obtained permission to test his vaccine in the Mayo Hospital, Lahore, and he collaborated with me in this part of my investigation.

The sores of all cases were first examined for the presence of leishmania, and only the positive cases were given the vaccine treatment. 0.5 c.cm. of the vaccine (undiluted) is injected into the subcutaneous tissues of the arm. The patient is seen again after 24 and 48 hours for evidence of any reaction—general and local. The reaction when it occurs is both general and local, and is evident in 24 to 36 hours after the injection of the vaccine. It consists in a rise of temperature not exceeding 100°F., and headache; and there is swelling and redness at the site of the injection and hyperæmia of the sores wherever situated. In the absence of a severe reaction, the injections are repeated with double the dose, at intervals of four to seven days, till the sores heal up. Healing of the sores proceeds from without inwards, and they gradually diminish in area. Dry scales finally drop off and the cure is complete. During the period the treatment with vaccine is being given, the sores are not treated with any other local remedy, but are covered with a simple surgical dressing.

Results.—So far, 35 cases have completed their treatment with the vaccine. Twenty-five cases were cured without getting any other treatment and the largest number of injections given in any one case to achieve this end was seven, and the least number of injections given was two. Six more cases showed definite improvement for the first three injections given to them, but did not show any change with the next three injections. Four cases did not show any change, or showed only slight improvement with the first three injections each.

The following conclusions were arrived at regarding this form of treatment:—

Oriental sore vaccine is of considerable value in the treatment of sores of all types.

In most of the cases with type IV sores, or with multiple sores, where treatment by berberine sulphate is not possible and the results of treatment with antimony have not been satisfactory, the treatment with the vaccine is of the greatest value.

In cases with sores on the eyelids, nose, lips, forehead, etc., in which it is not possible to give injections and in which carbon dioxide snow applications result in extensive scar formation, treatment with vaccine has proved a great success.

Even in those cases where treatment with vaccine does not produce any change or only slight improvement, it is advisable to combine it with the other method of treatment used.

Such a combination serves to hasten cure by stimulating the general protective mechanism of the body against protozoal infection, and prevents the delay that occurs in the healing of the sores after the specific infection has disappeared from the local site.

The vaccine is not available for general use as yet. If, as a result of trials to which it is being submitted, its efficiency is established, it is hoped that the manufacture of the vaccine will be taken up in India.

Summary

1. Oriental sore is no longer looked upon as a local disease requiring treatment of the affected site only. A generalized reaction seems also to be present in the body at the same time. As a consequence of this assumption a vaccine has been prepared from *L. tropica* and tried in the treatment of the disease. The results obtained so far from these trials have been very encouraging.

2. Berberine sulphate treatment should never be given to cases where acute inflammation or sepsis is present in sores. Therefore, the most suitable cases for this mode of treatment are those where sores of types I and II are present. Even in cases of this kind berberine sulphate treatment should be combined with the administration of the vaccine. As a general rule a one per cent solution should be used, but the sores should be infiltrated completely. However in cases with sores of type II, where an overgrowth of fibrous tissue is present in the sores, a two per cent solution is recommended for the injections.

3. The maximum quantity of berberine sulphate which can be infiltrated safely in cases of multiple sores occurring in otherwise healthy adults is 4 c.cm. of a one per cent solution equivalent to two-thirds of a grain of the salt.

4. There does not appear to be any need for previous application of a local anæsthetic prior to giving the infiltration with berberine.

5. With regard to treatment by antimony, results obtained by intravenous injections with tartar emetic solution have been more successful than with the other organic preparations of antimony tried so far.

REFERENCES

- Mayer, M., and Ray, J. C. (1928). Züchtung und Differential diagnose verschiedener Leishmanien auf festen Nährboden. *Arch. Schiffs- u. Trop.-Hyg.*, Vol. XXXII, p. 277.
- Ray, J. C. (1932). Cultivation of Various Leishmania Parasites on Solid Medium. *Indian Journ. Med. Res.*, Vol. XX, p. 355.
- Row, R. (1912). Curative Value of Leishmania Culture 'Vaccine' in Oriental Sore. *Brit. Med. Journ.*, Vol. I, p. 540.
- Warma, J. D. (1931). Oriental Sore. *Indian Med. Gaz.*, Vol. LXVI, p. 383.

CLINICAL OBSERVATIONS ON 636 CASES OF CEREBRO-SPINAL FEVER TREATED IN THE CAMPBELL HOSPITAL, CALCUTTA, FROM MARCH 1933 TO MARCH 1934

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DURING the period from 1st March, 1933, to 1st April, 1934, 636 cases of cerebro-spinal fever were admitted and treated in the Campbell Hospital. Information on various points in connection with this disease was collected and is

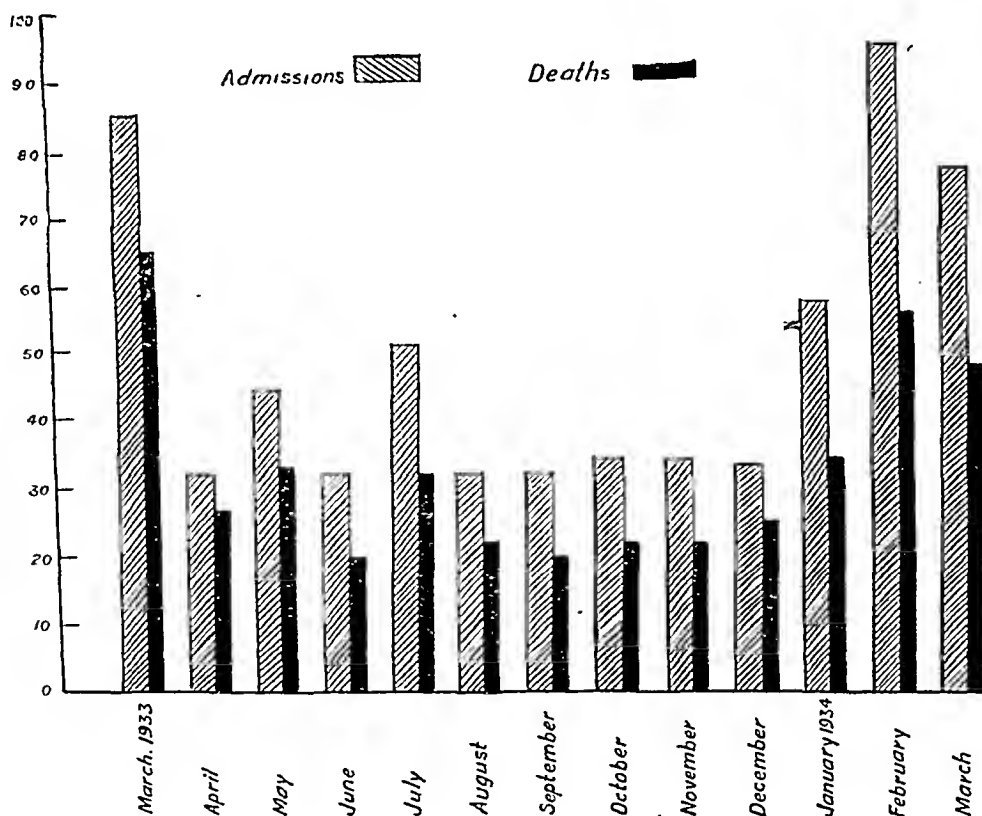
The largest number of cases occurred during January, February and March. February was the worst month, showing an admission of 94 cases. The average monthly incidence for January, February and March was 76, against 36 for the other months; that is to say, the cold weather was the optimum time of the year for incidence (table A and graph 1).

(b) Sex (table A).—Of the 636 cases, 589 were males and 47 females, i.e., 92.5 per cent and 7.5 per cent, respectively. The overwhelming preponderance of incidence amongst males may to a certain extent be due to the following factors:

- (i) Greater reluctance on the part of female patients to come to hospital.
- (ii) Females lead a more secluded life than males.

However, we are of opinion that in Calcutta the disease affects males to a much greater extent than females.

GRAPH 1
CEREBRO-SPINAL FEVER
Seasonal incidence and deaths



shown in the tables and graphs appended herewith.

Epidemiology

(a) Season.—The disease was prevalent in Calcutta throughout the period under report.

(c) Age (table B and graph 2).—The graph shows the high incidence of the disease between the ages of 15 and 35. Children were far less affected than adults or even old people. The disease was conspicuously rare under four and above 55. 69.5 per cent of the cases that

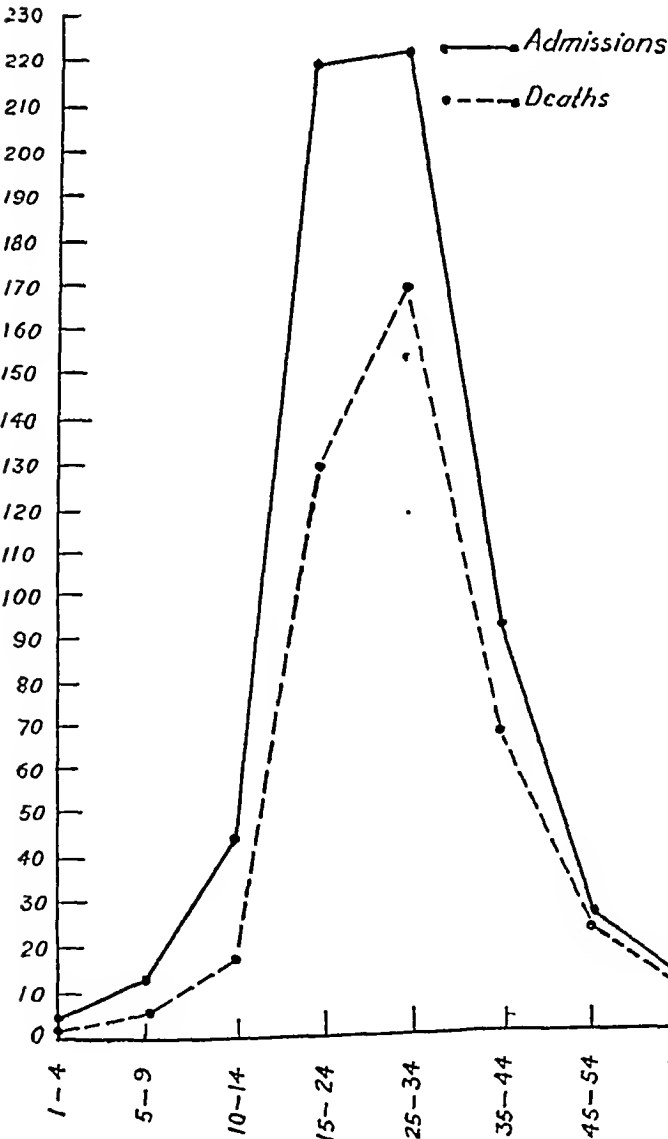
TABLE A
Caste and sex incidence in cerebro-spinal fever, by months

Month			HINDU		MOHAMMEDAN		OTHER CASTE		Total
			Male	Female	Male	Female	Male	Female	
March	1933	..	60	5	19	0	0	1 *	85
April	"	..	23	2	5	0	2 †	0	32
May	"	..	28	4	12	0	0	0	44
June	"	..	25	0	6	0	1	0	32
July	"	..	35	2	13	0	1 ‡	0	51
August	"	..	25	2	5	0	0	0	32
September	"	..	25	1	6	0	0	0	32
October	"	..	23	2	9	0	0	0	34
November	"	..	23	3	7	0	0	1 *	34
December	"	..	19	2	10	1	1 †	0	33
January	1934	..	45	1	11	0	0	0	57
February	"	..	72	5	16	0	1 *	0	94
March	"	..	48	14	12	1	1 †	0	76
TOTAL			451	43	131	2	7	2	636

* Anglo-Indian. † Chinese. ‡ Jew.

GRAPH 2

CEREBRO-SPINAL FEVER
Incidence and deaths in the different age-groups



occurred were between the ages of 15 and 35—an age-period when people lead strenuous active social lives and are exposed to a much greater extent to infection.

(d) *Race* (table A).—Out of 636 there were 494 (77.67 per cent) Hindus, 133 (20.91 per cent) Mohammedans, and 9 (1.41 per cent) other castes (Anglo-Indians, Jews and Chinese). This incidence is more or less proportionate to the racial population of Calcutta. We are not able to find any marked susceptibility to the disease in any community.

(e) *Environment and spread of disease*.—The majority of cases came from busties in Calcutta where poverty, overcrowding and insanitary conditions prevail. No special locality was effected. Cases came from all parts of the city. It was seldom found to affect more than one member, either of a family or of an institution.

The disease does not appear to us to be very contagious, as not a single case occurred amongst the hospital staff (medical officers, nurses, students and menials) who attended these cases. Only one case occurred in a junior compounder student of this school, but the infection could not be traced to a patient, as the student had no duties in the wards.

It is not possible for us to give any opinion as regards the rôle of carriers in this disease, but as far as our cases are concerned there does not appear to be much evidence indicating this means of spread. No attendant or convalescent patient was found to be in any way connected with patients admitted into this institution. About 300 doctors, nurses and students worked in this ward during the period under report and there is no evidence to show that any one of them acted as a casual or a chronic carrier.

TABLE B
Age incidence and mortality

Age-group	TOTAL ADMISSIONS		DEATHS		Cured	Results unknown	Percentage mortality
	Number	Percentage	Number	Percentage			
1 to 4 years ..	5	0.785	3	0.708	0	2	60.00
5 " 9 " ..	13	2.044	6	1.415	2	5	46.15
10 " 14 " ..	45	7.075	18	4.245	22	5	40.00
15 " 24 " ..	220	34.591	128	30.189	71	21	58.18
25 " 34 " ..	222	34.905	168	39.623	49	5	75.68
35 " 44 " ..	93	14.623	68	16.037	21	4	73.12
45 " 54 " ..	27	4.245	23	5.424	3	1	85.19
55 years and over ..	11	1.729	10	2.358	0	1	90.91
TOTAL ..	636	..	424	..	168	44	66.67

We are inclined to believe that the incidence of this disease is more a question of individual susceptibility than anything else, i.e., there are certain individuals in the community who are specially susceptible to the infection and whenever favourable circumstances prevail they get attacked with the disease. Of these favourable circumstances an inflammation of the nasopharynx plays an important rôle.

Symptomatology

Table C shows the incidence of the clinical types and their frequency. The hyperacute mode of onset was found the most common; it occurred in 362, i.e., 56.92 per cent of our cases.

Table D shows the comparative frequency of the various signs and symptoms. The more important symptoms, enumerated in the order of their frequency, were frontal headache, congestion of eyes, rigidity of neck, dilated pupils,

vomiting, coma, initial rigor, muscular tenderness, joint pains, and taches cérébrales.

Of the signs the following were the most commonly noticed:—Kernig's sign (88.84 per cent), Brudzinski's sign (76.25 per cent), lost knee jerks (34.11 per cent) and increased knee jerks (25.45 per cent).

A marked polymorphonuclear leucocytosis was noticed throughout. The average number of leucocytes was 25,150 per c.cm. The average number of polymorphonuclears was 80.9 per cent.

The cerebro-spinal fluid was under high tension in every case in which lumbar puncture was done; in 66 cases it was not done. Five hundred and twenty-one cases showed turbidity and polymorphonuclears were the predominant cells. Five hundred and seventy specimens of cerebro-spinal fluid were examined for the

TABLE C
Incidence of clinical types in cerebro-spinal fever, by months

Month	Total number of cases	Hyperacute or fulminant	Ordinary or acute	Subacute or chronic	Mild
March 1933 ..	85	57	16	5	7
April " ..	32	20	5	3	3
May " ..	44	26	6	5	7
June " ..	32	19	6	4	3
July " ..	51	28	9	5	9
August " ..	32	16	8	5	3
September " ..	32	12	9	6	5
October " ..	34	21	5	4	4
November " ..	34	20	4	5	5
December " ..	33	23	3	5	2
January 1934 ..	57	35	8	6	8
February " ..	94	46	14	9	25
March " ..	76	39	11	8	14
TOTAL ..	636	362	104	70	95
PERCENTAGE	56.92	16.35	11.01	14.94

TREATMENT OF TUBERCULOUS CARIES OF THE SPINE

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TUBERCULOUS caries of the spine is a serious disease and unless diagnosed early and appropriately treated, serious deformities and disabilities will result making the patient's life miserable. The complications of the disease, such as deformity, abscess formation (with secondary infection and sinus formation), and paraplegia, with the resultant further complications of bladder and rectal trouble, are a grave menace to the patient. Cases taken in hand early and appropriately treated offer very satisfactory prospects of cure. The diagnosis of this condition is easy with the modern methods at our disposal.

The spine is made up of a series of small joints which are under the constant and uncontrollable mechanical influence of various muscles attached to the spine. These joints are constantly moving during respiration. The osteogenetic power of the vertebral bones is low when compared with the long bones of the body.

Tuberculous caries of the spine is only a local manifestation of a generalized infection. General treatment, such as open air, improved hygiene, proper feeding and sunlight, is indispensable. The first essential in the local treatment is to obtain absolute rest to the diseased vertebræ and, while this is being maintained, to

(Continued from previous page)

plunger piston head, which can be made to fit as tightly as required by a device at the end of the handle part of the piston, can draw up any solution easily. By this arrangement it is impossible to get any backward leak during the act of injecting the solution, as occurs with most ordinary syringes.

All the twelve cases have been completely cured and there has been no recurrence in any of them up to date. The glands took from three to eight months to clear up. Some of them have been cured for over eighteen months. Although only accessible glands were injected, the affected deep cervical glands which were present in some of the cases have also cleared up. I cannot definitely account for this, and can only presume that this was effected by the drainage of the solution through them. Some of the patients treated were 'positive-sputum' cases, and two of these are still under my care. The lung condition in the cases referred to above has also become 'arrested' under treatment, and the patients are making good progress. It has to be understood that this method of injecting the glands has to be combined with general treatment laid down for pulmonary cases, as most of these had their lungs affected.

improve the patient's general condition by various adjuvant methods. Three conditions are called for—

- (a) recumbency in the dorsal position,
- (b) absolute immobilization of the spine, and
- (c) prevention or correction of the deformity by hyperextension of the spine.

When correction has been obtained the spine has to be immobilized in this position till such time as consolidation by recalcification has been obtained.

The spasm of the back muscles and the muscles of the anterior abdominal wall do not permit of immediate assumption of dorsal recumbency for a long period. This is all the more difficult in cases with complications like a pronounced 'gibbus', a large psoas abscess, or paraplegia. If dorsal recumbency is assumed for a few hours a day and the period is gradually increased daily it is easy to get a willing patient to lie in that position for twenty-four hours. In children and particularly refractory cases and in caries of the cervical vertebræ, the head is fixed by a box splint, or occipital and chin bands. When there is paraplegia both the lower extremities are immobilized by applying weight extension. Once the patient has become accustomed to assume dorsal recumbency, correction of deformity is started. Various contrivances are in use:—(1) Whitman's gas pipe frame is useful in children; (2) treatment by a plaster shell is useful, but is not tolerated by patients and has often been a failure among patients in the tropics; (3) Thomas' splint is cumbersome; (4) Berk's spinal board has given good results.

Sir H. Gauvain has said:—'The simpler the appliances employed the greater the comfort ensured for the patient, and the fewer the complications in the apparatus the better the results will be'.

Having tried the various methods described above I have come to the conclusion that hyperextension in dorsal recumbency can very efficiently be obtained by the introduction of a

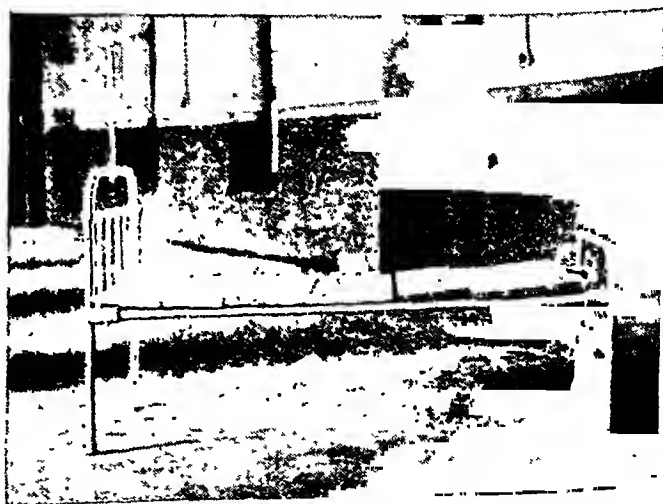


Figure 1a.

PLATE XV



Figure 2



Figure 3

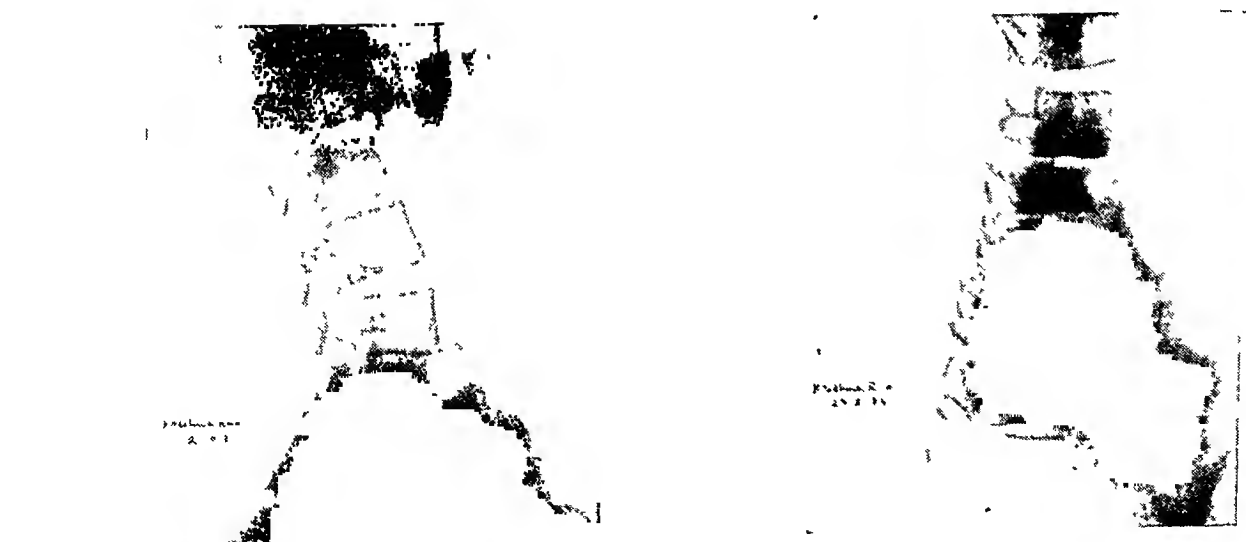


Figure 4

wedge in the fracture board (figure 1a). The apparatus is simple, costs next to nothing, and is made of a wooden wedge fixed to one of the fracture boards, so adjusted that the 'gibbus' of the spine rests on the wedge while the patient is lying in dorsal recumbency. When so adjusted the gibbus is supported by the wedge and

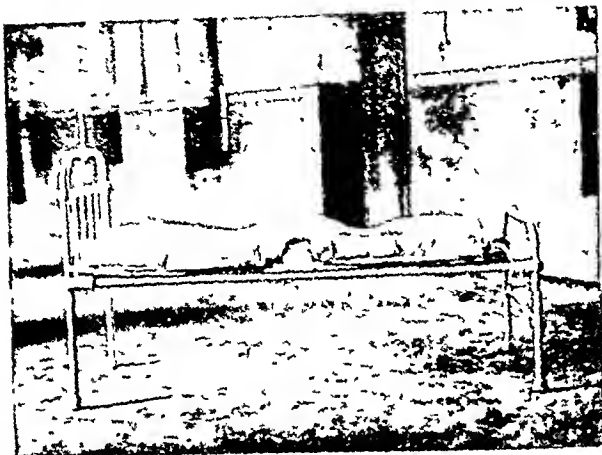


Figure 1b.

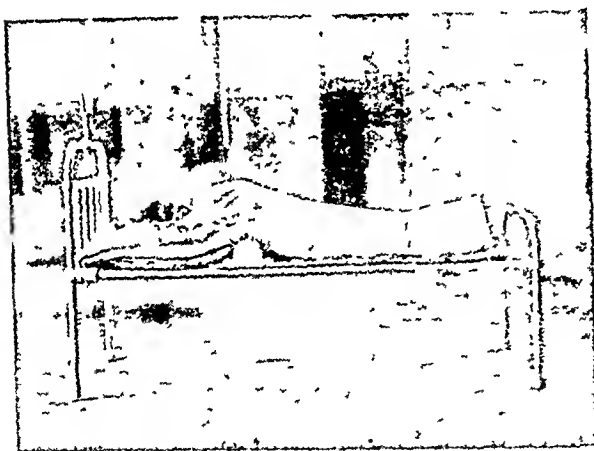


Figure 1c.

the trunk above and below the wedge rests on the bed and hyperextension of the spine is thus obtained (figure 1c). The height of the wedge is gradually increased until the maximum is reached. This position is maintained for a period of six months or more, under proper hygienic conditions and the attention of the trained nursing staff. This method of hyperextension in dorsal recumbency has given me excellent results and I believe in time should replace all complicated apparatus and particularly the irksome plaster-of-Paris casts.

Lateral radiograms are taken every two months or more frequently to check the progress of the improvement. The deformed spine, with the primary and secondary compensatory curves, straightens itself and maintains the

anterior longitudinal axis. The destroyed, deformed and crushed body of the vertebra (or vertebrae) is corrected. Recalcification and consolidation appear. In the later stages a wedge-shaped, crushed vertebra alters its shape, increases in size and appears like a modified normal vertebra (plate XV, figures 2, 3 and 4).

A maximum period of twelve months and a minimum of nine months is spent in dorsal recumbency on the wedge. Depending upon the progress of the case the wedge is lowered by stages and finally dorsal recumbency on a flat hard bed is maintained for a period of a month or two, when turning over to the side is permitted. Later, the patient is allowed a bed rest for a few hours a day until he is able to sit up. Then he is allowed to leave the bed on a wheeled chair. Walking with a pair of crutches is then resorted to.

Treatment of complications.—Rigidity of the back and abdominal muscles is overcome gradually by position and hyperextension. In the correction of deformity it must always be kept in mind that we are dealing with a tuberculous patient. Hurried and forcible correction of the deformity is unwise and will end in disaster. Paraplegia is mainly due to pressure on the cord by the extradural tuberculous granulation tissue. Rest in the recumbent position and hyperextension results in absorption of granulation tissue and removal of the pressure.

Abscess formation.—It cannot be too strongly stated that tuberculous abscesses should not be opened under any circumstances. Absorption of the abscess while the patient is resting may take place; but there is the danger of the abscess extending and destroying the surrounding tissues. Small abscesses may be left alone for absorption. Aspiration and repeated aspiration while in hyperextension are said to completely eradicate the abscess. Aspiration of the abscess and injection of modifying antiseptic fluids are advocated. I have for the last three years employed repeated aspirations and injections of hot water under tension at 70°C. clipping the aperture to prevent leakage. The second and subsequent aspirations dislodge a more liquid content, and pain and temperature are relieved by the effect of the hot water. Just what the effect is I cannot say but this method has given me excellent results, and I am of opinion that treatment by aspirations and hot water injections has a future.

Case reports

1. Mrs. R., aged 27 years, admitted on 23rd April, 1933, for caries of the second lumbar vertebra with angular deformity, a psoas abscess in the right iliac fossa and dragging of toes while walking. She was put on the wedge immediately. Nine ounces, six ounces and two and a half ounces of pus were aspirated on 15th May, 17th June and 18th July. Patient was allowed to walk on 1st March, 1934. Patient is going about normally now (plate XV, figure 2).

(Continued at foot of next page)

CARCINOMA OF THE STOMACH*

By U. P. BASU, M.B., F.R.C.P. (Ire.)

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Introduction

ABOUT twenty-five years ago Robson and the staff of the Mayo Clinic suggested on the strength of histological examinations of a very large number of gastric ulcer cases sent for operation that gastric carcinoma was the frequent sequel of gastric ulcer. As certain islands and ingrowths of epithelium often became involved in the fibrous tissues of the ulcers they were of opinion that these were evidences of malignant changes which were the ultimate end of the majority of gastric ulcers. They found many supporters for their views amongst the medical men of different countries, notably among the American workers. Based upon this assumption many textbook writers even to this day hold that quite a good number of cases of gastric cancer originate from malignant degeneration of chronic gastric ulcers. The writer of this paper has made an attempt to ascertain the truth of this statement and he is putting forward the difficulties he met with in carrying out this investigation, the data he gathered together, and his own experiences and observations about carcinoma of the stomach.

Ætiology

Between the years 1914 and 1933, only twelve cases of cancer of the stomach could be collected from post-mortem examinations conducted at the Calcutta Medical College. It will be unwise to form an estimate of the prevalence of this disease amongst the indoor patients from the number of cases thus collected from the autopsies, as such figures will be small compared with the actual admissions for the same disease,

* Being a paper read before the British Medical Association on the 20th of April, 1934.

(Continued from previous page)

2. Mrs. P., aged 30. Admitted on 23rd August, 1933, for caries of the second and third lumbar vertebræ of one year's duration. Had difficulty in standing erect. No psoas abscess. She was put on the wedge. Successive radiograms show recalcification and consolidation (plate XV, figure 3). She is now sitting up.

3. Mr. K., 22 years. Admitted on 30th September, 1933, with a large psoas abscess in the right iliac fossa. Wedge introduced on 1st October. Twenty ounces, eleven ounces and five ounces of pus were aspirated on three occasions. Patient is now sitting up (plate XV, figure 4).

4. Mrs. S., aged 25. Admitted on 10th April, 1934, for caries of the eleventh and twelfth dorsal vertebræ with angular deformity. She was put on the wedge for three months. Deformity was partially corrected. Patient refused further treatment and left. Readmitted with spastic paraplegia and incontinence of urine and faeces. She is now undergoing treatment.

owing to the great scarcity of necropsies that are held on patients who die in Calcutta hospitals. For instance, the total number of medical, surgical, obstetrical, gynaecological and eye cases that were admitted into the Medical College group of hospitals from the beginning of January 1933 up to the 2nd of December, 1933, was 11,815; the number of deaths that occurred during the same period was 1,208, and the total number of post-mortem examinations that were held during the same period excluding the medico-legal cases was only sixty! In an investigation like this the ante-mortem diagnosis can never be accepted on its face value, in the absence of post-mortem confirmation. The writer may be pardoned for the digression when he says that the time has come when there should be some legislation to make post-mortem examination compulsory on every hospital dead body. Indeed that would be a forward step in the progress of medical education in our province. The writer had therefore no other alternative but to confine his remarks on these one dozen cases.

Macleod, Professor of Medicine, London University, reported from the records of St. Thomas's Hospital, London, one hundred and twenty-eight cases of gastric cancer during the years 1921-1924 in which the age incidence was between thirty and forty years in only eleven cases. It is a striking fact that in the writer's small series of twelve cases, in one of whom the actual age could not be ascertained, in no less than seven cases the age incidence was between thirty and forty years. As chronic gastric ulcer is also a disease commonly seen in Bengal between thirty and forty years of age and as the average duration of symptoms of this disease is approximately seven and a half years, the assumption that chronic gastric ulcer undergoes malignant changes does not hold water, at any rate from the point of view of age incidence, for obvious reasons. A careful search through the records of these twelve cases failed to reveal any history which could establish the theory that chronic gastric ulcer is a common precursor to gastric carcinoma. As a matter of fact none of the cases of the writer's series showed any evidence of pre-existing chronic ulcer on histopathological grounds.

Pathology

Three of these cases were scirrhus cancer, three columnar-celled, one epidermoid, and the remaining five of the ulcerative type. Nine were found in the pyloric orifice and the pylorus was stenosed in two cases, the remaining three were at the cardiac end, secondary deposits were present in the liver only in one case, liver and pancreas in two cases, liver and gallbladder in one case, anterior mediastinal glands in one case, pyloric group of lymph glands in one case, and gastric glands in one case.

Symptomatology

It seems that the American observers brought forward this 'ulcer-cancer' bogey purely on the strength of laboratory findings, for clinical observations do not lend support to such a theory. Instead of being afraid to eat on account of pain, which is so characteristic a feature of gastric ulcer patients and which trouble continues and aggravates as years pass by, the majority of stomach-cancer cases of the writer's series were seen amongst gluttons who devoured large quantities of food and would often boast of digesting nails, in whom suddenly the symptoms of dyspepsia set in as an acute disease which arose *de novo*. The early symptoms were diminution of appetite, flatulence and anæmia. The loss of appetite can to some extent be correlated to the diminution or absence of gastric juice in the stomach; for the chain of events that follows is a gradual decrease in the hydrochloric acid followed later by diminution in neutral chloride and pepsin. With the onset of the disease the patients began to feel for the first time that they had a stomach and from this time onwards there was always a sensation of persistent discomfort. Vomiting was generally present and in many cases the vomitus was of a foul odour and was followed by incomplete relief. Hæmatemesis and melæna were present in two cases only and the bleeding was frank and copious in both of them, and not a constant oozing, giving rise to a dark disintegrated blood in the stomach contents, the so-called 'coffee ground' colour. Pain was not a constant association and was present in four cases only. When once it appeared it never left the patient. Food brought on exacerbation of this pain. As the disease progressed, what generally happened in these cases was that the patient rapidly lost strength and weight, the anæmia became profound and was accompanied in some cases by nausea and special repugnance for protein food. Later on, with the appearance of extreme emaciation unaccounted for by the vomiting and the diminished intake of food, the disappearance of subcutaneous fat, and œdema of the abdominal wall, back and ankles, the picture of cachexia was complete; local tenderness over a fairly extensive area was usually present, a hard tender tumour was palpable over the epigastrium in three cases and Virchow's gland was felt in one case.

Diagnosis

Between the three special methods of investigations for confirming the bed-side diagnosis of gastric cancer the test meal findings rank first in order of importance. The ordinary one hour method following an oatmeal gruel is quite satisfactory for the purpose of a diagnosis and the fractional meal is much too exacting and is wholly unnecessary. It is very desirable that the stomach should be washed out thoroughly

before giving the test meal in order to exclude the presence of lactic acid arising from fermentation of retained and stagnating stomach products. Absence of free hydrochloric acid and the presence of an appreciable quantity of lactic acid in the test meal may be taken as definite evidence of cancer of the stomach. The resting juice shows pus cells and red corpuscles. The next method in order of importance for the diagnosis of cancer is the detection of occult blood in the faeces; unlike that of gastric ulcer the peculiarity of occult blood in gastric carcinoma lies in the fact that it persists in spite of treatment, as does the pain associated with this condition. The last in order of importance from the point of view of diagnosis comes the x-ray findings in this disease. The much-talked-of filling-defect which is believed in many quarters as indispensable for a positive diagnosis is never seen in carcinoma of the pars cardiaca as the opaque meal can hardly reach beyond the gas bubbles. Nor does the infiltrating scirrhus cancer project sufficiently into the barium-filled lumen of the stomach to give rise to such a defect. Even when the growth involves the pars pylorica, owing to the difficulty of obtaining a clear outline of this region because of its proximity to the spine and the tendency of the barium to settle away from the pylorus, small filling-defects in this situation are very often overlooked. I quote below three extracts from the reports of radiologists in definite cases of carcinoma of the stomach, to substantiate my contention:

(1) The stomach is dilated and dropped; there is marked spasm of the pylorus; irregularity of the contour is noted in this region.

(2) Meal in the stomach after nine hours; almost complete pyloric stenosis, cause not certain.

(3) Niche in lesser curvature and irregularity in its neighbourhood suggesting ulcer of lesser curvature.

Even when the filling-defect is present it may be due to numerous causes other than cancer, such as faulty media in which the barium is unevenly distributed, secretion imprisoned in the pyloric end of the common fish-hook type of stomach, food remnants, hair balls, gas or faecal matter in the colon, barium in the bowel adjacent to stomach, lordosis and scoliosis, pressure on the stomach, pressure of a deformed costal arch, strong retraction of the upper abdominal wall, spasms, adhesions, extrinsic tumours, distortion and distension of the stomach by ascites, ovarian, cyst or pregnancy, and above all by benign tumours producing lesions in the stomach.

Prognosis

The inevitable end of this disease is death which generally takes place from within a year

to eighteen months from the date of commencement of the symptoms. In the two cases complicated with copious hæmatemesis and melaena, as stated above, the immediate cause of death was depletion of blood from the system.

Treatment

With cancer of the stomach nothing can be done medically and very little surgically. Despite its futility in confirming a bed-side diagnosis, the roentgen rays very often furnish valuable information in deciding the question of operation. The operable zone corresponds to the pars pylorica, the border-line zone to the pars media and the inoperable zone to the pars cardiaca. No doubt operability of a given case depends on the skill and judgment of the surgeon, but, besides this, certain radiological findings speak for or against operation, whether radical or palliative. The location extent and character of the growth are all matters of fundamental importance. The clinician can prevent useless operations, even when they are indicated by the radiograms, if he finds metastases in the rectus sheath, supra-clavicular glands, umbilicus, skin, or peritoneum. Gross metastases in the lungs and bones are roentgenologically demonstrable but they are very rare. An absolute decision for an operation can never be given until the incision is made and perforation or metastasis, which may have remained undiscovered, are excluded. Even when the growth is excised, as in the majority of cases of cancer of the body of the uterus and breast, the ultimate end-results are wholly unsatisfactory and the patient seldom survives the operation beyond a few years. Yet the surgeon is of great assistance in these cases, as, when morphine fails, the knife is the only means of relieving the intense pain and the pyloric obstruction. Deep ray therapy is a failure in this disease, but radium can be applied locally. The medical treatment is purely palliative and depends upon careful dieting and massive doses of morphine when there is indication for the same.

I thank Dr. M. N. De, M.B., M.R.C.P. (Lond.), Professor of Pathology, Calcutta Medical College, for the use of pathological records, and to Dr. S. A. Sharma, M.B., D.T.M., for compiling the record of these cases.

[*Note.*—Whilst admitting that the prognosis in gastric carcinoma is bad, we do not feel that it is as bad as the writer implies. Everything depends on an early diagnosis; and if we were to take this pessimistic view of the eventual outcome of the disease, it would scarcely be worth trying to make this early diagnosis. About 75 per cent of cases are inoperable when first seen by the surgeon, but of those who survive operation 20 to 25 per cent are alive and well at the end of five years. This of course reduces the survival rate amongst those in whom the disease is diagnosed to less than 5 per cent, but with earlier diagnosis this rate is capable of improvement.—EDITOR, *I.M.G.*]

MOLLUSCUM CONTAGIOSUM

A PRELIMINARY NOTE ON THE TREATMENT

By L. M. GHOSH, M.B., D.T.M. (L'pool)

Skin Diseases Enquiry under the Indian Research Fund Association, School of Tropical Medicine, Calcutta
(By kind permission of Dr. E. Muir, M.D., F.R.C.S.,
Officer-in-Charge, Skin Diseases Enquiry)

MOLLUSCUM CONTAGIOSUM is caused by a filter-passing virus, this has been definitely proved by recent work (Wile and Kingrey, 1919) and has been accepted by most workers. The infection is a local one and the disease spreads by contagion. The same workers have shown that the contents expressed from a molluscum nodule contain a virus which inoculated into man can reproduce the disease.

Infection in man is probably by direct contact and also from infected baths or clothing. Epidemics in boarding schools have been traced to a common bath.

Not much work has been done from the point of view of the treatment of the disease and the production of immunity so as to prevent epidemics which may be a serious menace in boarding schools.

The disease is said to be self-limiting. Though this may be so it still runs a long course—at least six months—and within that time there is the danger of infecting several people or of starting an epidemic if it occurs in that boarding school.

Accepting the theory that molluscum is conveyed by a filter-passing virus and the infection a local one, the virus being confined to the molluscum nodules, I prepared a vaccine by emulsifying a nodule and killing the virus by formalin. The result of the injection of this vaccine was very encouraging and in all the cases tried so far the result has been uniformly successful. About a fortnight is required for the complete cure but the improvement is noticed after ten days from the beginning, i.e., after the third or fourth injection. The nodules first shrink, then dry up and drop off by themselves.

We have not had any relapses as yet though six months have elapsed with many cases.

Specificity.—We have not yet been able to determine whether an autogenous vaccine, prepared from the patient's own nodules, is more beneficial than a stock vaccine prepared from the nodules of other patients.

Technique for preparing vaccine.—Having sterilized the skin with a mixture of equal parts of ether and alcohol cut off two or three nodules with a pair of sharp scissors (avoid cutting normal skin). Collect the cut nodules in a small sterile test tube previously weighed accurately in a fine balance. Then find out the weight of the nodules. About 20 milligrammes are required for which two medium-sized nodules will be sufficient. Measure out in a sterile test tube freshly prepared sterile normal saline solution in the proportion of 1 c.cm. per milligramme

of nodule. Grind the nodules well with sterile pumice stone powder or fine sand in a sterile agate mortar until the emulsion is uniform and no tissue is felt or seen—adding the normal saline at intervals in small quantities. When the emulsion is completed add the remainder of the normal saline. The emulsion is then filtered first through krysolgar and then through an L3 Chamberland fine bacterial filter candle. Incubate the filtrate for 24 hours and then test for sterility. This forms the stock active emulsion.

Dilution.—Take 2 cubic centimetres of the stock active emulsion and add 8 cubic centimetres of formalized saline (i.e., normal saline with 0.2 per cent formalin which is about 40 per cent formaldehyde). Test again for its sterility against contamination and the vaccine is ready for injection. As formalized saline is a little painful our next series of cases is being tried with carbolyzed saline.

Injections.—Intradermal injection is given every third or fourth day beginning with 0.1 c.cm. or 0.2 c.cm. and increasing by 0.1 c.cm. or 0.2 c.cm. each time, according to the reaction. Altogether about five or six injections are necessary but the patient begins to feel better generally after the third and is cured or almost cured after the fourth or fifth injection. There are no local and general reactions and no contra-indications.

The work is still being continued along with the work on infective warts on the same lines, but as the disease is not of common occurrence the progress necessarily is slow.

My thanks are due to my colleagues Dr. D. Panja and Dr. N. C. De for their ungrudging help and useful advice.

Case reports

In all the cases reported below intracutaneous injections of vaccine (prepared from molluscum nodules as stated above) were given every third day. In all cases except case I no other treatment was given besides the injection of vaccine.

Case I. H. L., Anglo-Indian, aged 11 years

Previous history.—He had herpes zoster two months ago.

Present condition.—He is suffering from pityriasis rosea and molluscum contagiosum for two weeks. The molluscum nodules were spread over the abdomen and front of the chest and a few were present on the arms.

Treatment.—Pulvis hexamine gr. iijss internally twice daily.

Locally.—Baths of Condy's fluid once daily.

Injections of vaccine prepared from molluscum nodules of another boy named Haridas Lalji were given as follows :—

1st dose—0.1 c.cm., 2nd dose—0.2 c.cm., 3rd dose—0.5 c.cm., 4th dose—0.8 c.cm. and 5th dose—1 c.cm.

The boy began to improve after the third injection and was completely cured after the fourth injection.

Case II. H. P. H., Hindu male, aged 25

Suffering from molluscum contagiosum for two months. Molluscum nodules were present on the forehead, face and upper part of the chest. Condition is still on an increase and fresh nodules are cropping up.

A piece was removed and section confirmed the diagnosis—no other treatment was given except the injections of vaccine as follows :—

1st dose—stock vaccine made from Haridas Lalji—0.2 c.cm.

2nd dose—stock vaccine made from Haridas Lalji—0.4 c.cm.

3rd dose—autovaccine made from his own nodules—0.6 c.cm.

4th dose—autovaccine made from his own nodules—0.8 c.cm.

5th dose—autovaccine made from his own nodules—1 c.cm.

The patient began improving after the third injection and was fully cured after the fifth injection.

Case III. S. D., Hindu female, aged 32

Suffering from molluscum contagiosum for one month. Molluscum nodules were present on the arms, face and trunk.

Treatment.—No other treatment was given except injection of stock vaccine prepared from H. P. H., case II, as follows :—

1st dose—0.2 c.cm., 2nd dose—0.4 c.cm., and 3rd dose—0.6 c.cm., fully cured after the third injection.

Case IV. T. N. D., Hindu male, aged 20

Suffering from molluscum nodules for two months and the disease is still spreading. Fresh nodules are coming up. Molluscum nodules were present on the forehead, face and left axilla.

Treatment.—Injections of vaccine were given as follows :—

1st dose—stock vaccine prepared from case II (H. P. H.)—0.1 c.cm.

2nd dose—stock vaccine prepared from case II (H. P. H.)—0.2 c.cm.

3rd dose—autovaccine prepared from his own nodules—0.4 c.cm.

4th dose—autovaccine prepared from his own nodules—0.6 c.cm.

5th dose—autovaccine prepared from his own nodules—0.8 c.cm.

6th dose—autovaccine prepared from his own nodules—1 c.cm.

Improvement was noticed after the fourth injection and the patient was fully cured after the sixth injection.

Case V. R. K. M., Hindu male, aged 15 years

Suffering from molluscum contagiosum for one month and the disease is still spreading. Molluscum nodules were present on face, neck and forehead.

Treatment.—Injections of stock vaccine from case IV (T. N. D.) as follows :—

1st dose—0.1 c.cm., 2nd dose—0.2 c.cm., 3rd dose—0.4 c.cm., and 4th dose—0.6 c.cm.

The patient was completely cured after the fourth injection.

Case VI. K. L. D., Hindu male, aged 21 years

Duration of the disease is two months and the condition is still spreading. Molluscum nodules were present on the neck, chin and all over the chest in front and back.

Treatment.—Injections of stock vaccine prepared from case IV (T. N. D.) as follows :—

1st dose—0.2 c.cm., 2nd dose—0.4 c.cm., 3rd dose—0.6 c.cm., 4th dose—0.8 c.cm., 5th dose—1 c.cm., and 6th dose—1 c.cm.

Improvement was noticed after the sixth injection, and he was completely cured after the sixth injection.

REFERENCES

Brain, R. T. (1933). *Brit. Med. Journ.*, Vol. II, p. 191.

- Crowley, C. G. (1929). *Med. Journ. Australia*, Vol. I, p. 806.
 Goodpasture, E. W. (1933). *Science*, Vol. LXXVII, p. 119.
 Whitfield, A. (1929). *Brit. Journ. Dermat. and Syph.*, Vol. XII, p. 10.
 Wile, U. J., and Kingrey, L. B. (1919). *Journ. Cutaneous Dis.*, Vol. XXXVII, p. 431.

A Mirror of Hospital Practice

MULTIPLE URETERAL STONES IN A URETEROCELE AND URETER

By N. MANGESH RAO, M.D., C.M., F.R.C.S.I.
 Surgeon, General Hospital, Madras

ANKAYYA, a Hindu male, aged 35 years, was admitted to the General Hospital, Madras, under my care on the 10th February, 1934.

Previous history.—He gave a history of frequency of micturition, burning sensation and occasional attacks of severe colic extending over eighteen years. He had passed small stones especially after the attacks of colic. He had passed in all nineteen stones.

On admission.—A well-nourished adult, complained of pain and tenderness in the left side of the hypogastrium and attacks of right renal colic. Urine was cloudy, alkaline and contained pus cells and some red blood corpuscles.

A roentgenogram showed a chain of stones in the right ureter extending from the sacro-iliac joint and ending in a hood-like mass to the left of the middle line.



X-ray diagram of Ankayya taken after admission.

Cystoscopy on 12th February.—The left ureteral opening was of normal size and in its normal situation. In front of this opening was a swelling with a pin-hole



Photograph of the reconstituted mounted specimen of calculi from Ankayya. (Kept in the Pathological Museum Medical College, Madras.)

opening at its top. A swollen ureter extending from this point upwards and to the right was discernible. The swelling was apparently a ureterocele packed with stones. This was cut into with a diathermy electrode and the opening was enlarged. The patient passed thirty-five stones in the next four days.

Cystoscopy on 17th February.—The right ureteral opening was fairly large but covered by a flap of thin tissue. This was burnt off by a diathermy electrode. A gloved finger was introduced into the rectum and the stones were massaged into the bladder. The patient passed twenty-five more stones in about four days. The last roentgenogram showed no stones. His urine began to clear up after this. He had meantime been put on hexamine, etc.

Cystoscopy on 5th March.—The right ureteral opening was 1 cm. by $\frac{3}{4}$ cm. and displaced nearer to its normal site. The efflux was still cloudy while that from the left ureter appeared normal. Indigo-carmin excretion following intravenous injection commenced in five minutes from the left ureter but was delayed for ten minutes with poorer depth of colour from the right.

The stones were mostly cuboidal in shape, the average dimension being $\frac{1}{2}$ cm. in each direction. The surfaces were smooth, greyish and appeared to be coated with phosphates.

The patient was discharged cured on 12th March, 1934.

Composition.—Total weight—13.95 grammes.

Calcium oxalate .. 74.2 per cent

„ phosphate .. 1.086 „

„ carbonate .. 10.01 „

Uric acid .. 1.277 „

Residue insoluble in 20 per

cent hydrochloric acid .. 3.347 „

Comment.—This is a rare case of multiple cuboidal stones held up as a chain in the ureter.

This was probably due to stricture of the right ureteral opening which must have been the cause of the ureterocele. The appearance and size of stones were suggestive of their being formed in one of the minor calyces. The stricture must have existed for a long time as sixty stones were held up in a dilated ureter, most of them being present in the lower part.

Fifty of these stones have been mounted to resemble the roentgenogram picture and preserved in the pathological museum of the Madras medical college.

I am obliged to the government x-ray institute, Madras, for the roentgenograms.

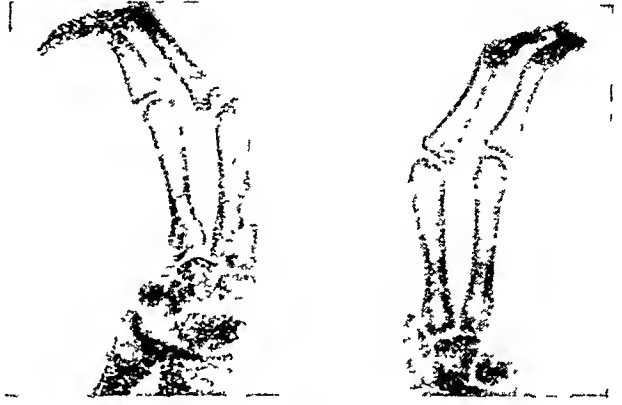
A CASE OF DEFORMITY OF THE BONES OF THE HAND AND FEET OF A MOTHER TRANSMITTED TO HER CHILD

By S SUBRAHMANYAM

Sub-Assistant Surgeon, Government Headquarters Hospital, Ootacamund

PAPPAMMAL, a Hindu female, was admitted into the maternity wards of the Government Headquarters Hospital, Ootacamund, for confinement (third pregnancy) on 21st April, 1931. She had had three confinements including the present one. On admission she

was found to be suffering from pernicious anæmia. The baby after her first confinement is stated to have lived for only a few months and to have had similar deformities to the mother. The second pregnancy resulted in an abortion. The child on this (last) occasion was stillborn, and the mother herself died on the 24th April about four hours after delivery, as the result of her extreme anæmic condition



Pappammal (mother), wrists and hands, antero-posterior view.



Pappammal (mother), feet and ankles, lateral view.

The following are the x-ray findings:—

The mother

Right foot.—The os calcis is fused with only the metatarsal present. The astragalus navicular and one cuneiform bone are present, the latter two being fused together.

Left foot.—Much the same as the right one except that there is no fusion here between the os calcis and the metatarsal.

Right hand.—The os magnum, trapezoid, and unciform bones are fused together.

magnum and cuneiform bones. There is a bony exostosis in one of the metacarpals.

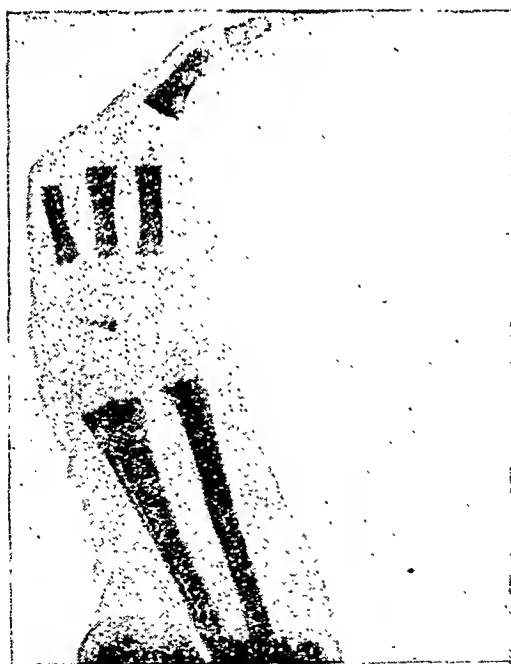
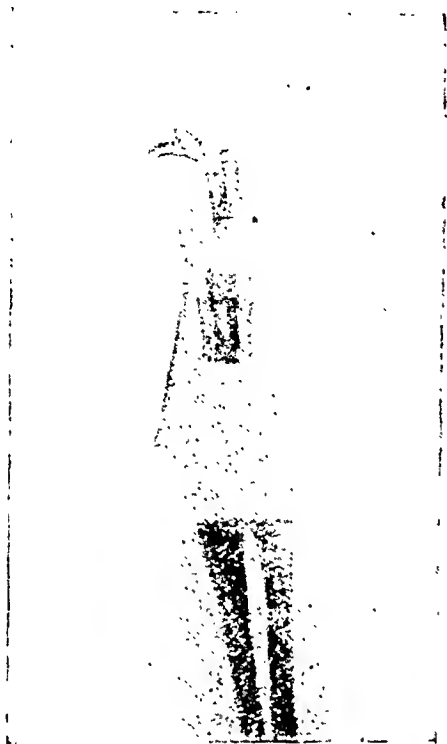
The child

Right foot.—Only the astragalus, os calcis, one metatarsal and one phalanx are present.

Left foot.—Same as above.

Right hand.—Only three metacarpals with a common finger (with three phalanges) are present. The carpal bones are absent.

Left hand.—Here also there is an entire absence of the carpal bones, and only three metacarpals are present; there are two fingers however, each having three phalanges.



Pappammal's child, wrists and hands, antero-posterior and lateral views.

The scaphoid is rudimentary. There are two metacarpals and phalanges.

Left hand.—The trapezium is diminutive in size and fused with the trapezoid bone. The unciform is also rudimentary and is lying wedged in between the os

My sincere thanks are due to Lieut.-Colonel A. S. Leslie, I.M.S., the superintendent of this hospital, for his kindness in permitting me to publish this case, using the hospital records.

*From the Medical Section of the Elisabeth-Diakonissen
und Krankenhauses in Berlin
(Director : Prof. Burghart)*

EXPERIMENTS WITH THE EXPECTORANT "TUSSIPECT"

by Dr. Hartmut Czerwonka.

The author first discusses the chemical and therapeutic properties of the ammonium salt of primula-saponin; and calls special attention to its power of acting effectively even in minute doses.

The active principle of Tussipeet, the ammonium salt of primula-saponin, has a double effect, because the action of the ammonium salt is combined with that of the saponin in loosening and increasing the bronchial secretion by decreasing its viscosity.

Tussipeet is available as a solution, syrup and tablets. One great advantage, as compared with the usual decoctions, etc., is that the content of active substance is constant. Another point is that the preparations of Tussipeet are cheaper than many other expectorants.

In hospital practice, the author gave one tablespoonful of the following mixture every two hours:—Tussipeet solution, 6.0, Liq. ammon. anisat. 2.0, Syr. simplex 20.0, Aq. dest. ad 200.0 This preparation is found to be most palatable. It can also be combined with other drugs, such as codeine, morphine, etc. The Liq. ammon. anisat. may be omitted if desired.

Tussipeet was given to some 280 patients, for whom an expectorant was indicated. In every case, Tussipeet had the advantage over the infusion of ipecacuanha in that it could be given as long as desired, without causing nausea or any other discomfort. Apart from a few cases in which a slight laxative effect occurred, no evidence of an action on other organs was observed.

Children enjoy Tussipeet syrup. Tussipeet tablets are very useful for ambulant cases.

The author observed specially good effects in the influenza epidemic of 1928-29: many patients were freed from their troublesome cough within a single day. Good effects were also seen in some cases of bronchial asthma, in which, of course, symptomatic treatment alone was insufficient. Even in some cases of pulmonary tuberculosis Tussipeet greatly relieved the troublesome cough.

Finally, the author summarises by stating that the Tussipeet preparations have proved to be good expectorants, have a pleasant taste, and are devoid of any deleterious action, even when given for long periods.

"Deutsche Medizinische Wochenschrift", 1929, No. 47.
Abstract.

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Indian Medical Gazette

NOVEMBER

MALARIA CONTROL IN BENGAL

WHEN Ross in 1898 *et ann. seq.* confirmed Manson's great hypothesis nothing much was known about mosquitoes, but as a class it was believed that they 'bred' in stagnant water, and so the cry arose for drainage and oiling, and viewed 'by and large' these measures have held the field to the present day.

In India the public health authorities from the first, rightly so it seems to us, recognized that the problem was primarily one to be approached from the point of view of the masses of India, and not from that of select communities, and therefore any measures to be applicable must take into account circumstances of the case such as the human equation, finance, and other proper considerations. Such a measure as oiling was thus ruled out, and as a matter of fact it must have been really very difficult to see what antimalarial measures could be adopted, and applied over such a wide area. Nevertheless we think that drainage, and especially the principle of contour drainage, which in very early days had been suggested for antimalarial work by a Malay States planter, should have been given some sort of trial; it was a measure which *a priori* was eminently reasonable and advantageous, and might have been practicable in at least many of the hyperendemic areas of India. Whether it would have been generally successful is another matter, but it should have we think been given a good trial.

In the absence of any proved measure which appealed to Government, the cry arose for research, more research and research all the time. As a result in the intervening years much fine work has been done, particularly in the direction of the classification of the mosquitoes, but has all this research gone for anything in the problem of malaria control amongst India's masses? No, beyond laying the foundations for future practical work, it has left the main problem of the prevention of malaria in India's masses as it was, and nothing more practicable than there was in, say, 1905 has been the result*.

In the meantime from Malaya came the news that jungle-cover over water usually prevented it from being dangerous, and this

was hopeful because in a way it was a new principle that Nature could be called in with prospects of success to assist in defeating the mosquito. One had certainly heard that the 'natural enemies' of mosquitoes should be 'encouraged' but that apparently never went further than paper, or at least not further than encouraging old ladies to put goldfish in their flower-pots. Here however was a biological measure, *de facto* a cheap measure, and applicable to the problem in hand. Yet this discovery has scarcely had more than lip service done to it; we certainly have not heard that it has been even tried where it might have been suitable for the protection of any of India's masses—in fact, not many years ago, a malaria expert on one of the State railways cut down the jungle that there was over a stream in a very malarious station and caused a rise in the malaria index of the station. He was indeed more than ten years behind the times! Ross, it was we think, who said that it takes ten years for a new idea to soak into the public cerebrum: in India the inertia seems more profound.

That is the story of what has not been done in the 35 years since Ross applied the match to the fuse. Now we believe that the first effort in the direction of applying suitable measures to the problem in India has been made; the observations of numerous laymen, notably certain civil administrators and Raja Digambar Mitter, together with those of sanitary officers, such as Colonels Fry and McCombie-Young, culminated in Dr. Bentley's essay on the relationship between malaria incidence and the natural flooding of the land from the rivers and *khals* of Bengal. He believed that a system of irrigation which would imitate the natural inundations from the *khals* would render the people at once healthy and prosperous. Although, as we shall see, his principles might be classed among those of biological control of malaria yet as the primary factor involved in his proposal was the physical inundation of the land, it would perhaps be better to refer to it 'a natural method' of malaria control. The main thing is that it would appear to be a feasible measure on the ground of cheapness, as Nature would do most of the work. Man would have to do some, and this would cost money, but it would be compensated for by the economic advantages of a more fertile land.

Dr. G. C. Chatterjee has lately been solving Bentley's equation in terms of fish; Bentley rather regarded the advantage as due to improved physical conditions—Chatterjee regards the inundations of the plains as only a means of disseminating fish, but otherwise subscribes whole-heartedly to Bentley's teachings which, we understand, the newly-created Rural Commissioner of Bengal, Mr. Townend, is now

* We ought perhaps to emphasize that this remark does not apply to malaria in select communities, such as military cantonments, tea gardens, and railway camps; here of course very useful work has been done and in many instances malaria effectively controlled.

attempting to implement, with Government's approval.

These movements are at last in the right direction, they attempt something big and feasible for the masses of India, and for the same reason the recently-instituted Malaria Survey of India is to be welcomed, for it takes research out of the parish-pump atmosphere into the wide spaces of Nature, where indeed the greatest discovery of the age, to wit, evolution through natural selection, was made. Bentley was no laboratory man and he observed natural events and profited accordingly, and the Malaria Survey of India will do the same. It has often been suggested that malaria survey work should be regarded rather as purely executive work of parochial interest than as

philosophical research, but we hope that this view will not prevail in the counsels of that institution for it would seem to us likely to prejudice their high aims and opportunities.

Another recent movement may be mentioned in conclusion, the attempt to implement the resolution of the Far Eastern Association of Tropical Medicine Congress in Calcutta in 1927 that *sanitary experiments* were desirable to test theoretical considerations. Experiments have recently been carried out in several provinces to test the value of plasmochin under local conditions. It is all to the good that such experiments should be made, and, whether they are successful or not, it is to be hoped that they will lead to further sanitary experiments on a large scale.

Special Article

SOME IMPRESSIONS DERIVED FROM EXPERIENCE IN CATARACT EXTRACTION*

By R. E. WRIGHT, M.D., C.I.E.

LIEUTENANT-COLONEL, I.M.S.

*Superintendent, Government Ophthalmic Hospital
Madras*

COLONEL WRIGHT reviews in certain of its phases the evolution of changes of technique and ideas in the hospital under his charge in the previous twelve years. The extent of this experience may be gauged from the fact that during this period some 20,000 cataract extractions were performed. Those who have visited the Madras clinic know that the extensive material available there is continuously being used for investigation, and careful observations are recorded up to the time the patient leaves hospital. As the author states 'we were enabled to investigate practically every variety of technique, whether recorded by others or conceived by ourselves, which appeared to provide simplification of method, greater safety in operating, or improvement in end-results'.

Methods which seem worthy of consideration are tried out in large numbers of cases; new procedures are not described and published on the strength of few case records, but subjected to the more exacting test of observation in bulk. Readers of the *Gazette* will probably be familiar with many of the ideas promulgated from the Madras clinic in the past, as recorded in the reports of the Government Ophthalmic

Hospital reviewed from time to time in these pages. Apart from these reports Colonel Wright has published relatively little on cataract in current ophthalmic literature and it is perhaps a pity that the Montgomery Lecture which elaborated some of his views should have been recorded in a journal not ordinarily perused by ophthalmologists. Those interested in cataract work would do well to read the paper in the original, but a few points may be touched on here.

Herbert's method of perchloride irrigation is relied on in hospital cases to prevent sepsis, and bacteriological reasons are given as to why it is not ordinarily expedient to make conjunctival cultures. In view of the irritation produced in certain patients an alternative to perchloride irrigation is approved, namely, preparation of the conjunctival sac by treatment with yellow oxide of mercury ointment and argyrol.

The most important changes which have evolved in the period reviewed are those associated with akinesia and anaesthesia. The blocking of the temporo-facial division of the seventh nerve with novocaine and adrenalin and the retrobulbar injection of this solution has changed the whole aspect of cataract extraction. The skilled assistant so essential to uniform success in India (and presumably elsewhere) 15 years ago is no longer necessary.

The general restfulness of the patient is insisted on and sedative drugs in big doses are used without hesitation; the custom so long prevalent of keeping the patient rigidly at rest is condemned, but the attainment of real quiet in the post-operative period is stressed in detail. For post-operative interference with the eye on the part of the patient Kirkpatrick's new shield is suggested (vide *Indian Med. Gaz.*, LXIX, 464).

* Being a résumé of the Montgomery Memorial Lecture, delivered in the Royal College of Surgeons, Ireland. The résumé was kindly prepared by Lieutenant-Colonel E. O'G. Kirwan, M.B., B.Ch., L.M. (Rot.), F.R.C.S. (Ire.), I.M.S., from a full report published in the *Irish Journal of Medical Science*, October and November 1933.

The evolution of the adoption of intracapsular extraction in the Madras clinic is traced, and an interesting dissertation given on the author's observations in connection with the influence of the zonule capsule barrier on the integrity of the vitreous body. After a careful study of the various forms of intracapsular extraction there has been a 'change of attitude' towards these methods. Twenty years ago capsulotomy was almost exclusively adopted in Madras, but this is no longer the case. To quote from the text 'It is interesting to note here that this change in attitude towards intracapsular extraction proceeded *pari passu* with a similar change in attitude in certain other centres of experimental study all over the world where extracapsular extraction had been previously preferred'. Expression, Barraquer's operation, and extraction by forceps are all employed in selected cases but still not so frequently as capsulotomy. Expression has a very limited application; the Barraquer procedure is said to be superior to the forceps method in respect of a less frequent rupturing of the capsule. It is more suitable for large institutions however and is not recommended to post-graduates on account of the lessened risk and the more simple instrumentation in forceps delivery. The author advocates a modification of Elschnig's forceps. The following portion of the lecture is quoted *in extenso*: 'I feel convinced that the forceps method is the best intracapsular technique for the majority of operators. It is the method I advise post-graduates, who have not had the advantages of working in a well-organized clinic or nursing home, to adopt in all cases to which intracapsular extraction is applicable.'

Its acceptance with these limitations has not yet become generalized, but its popularity is gradually increasing. The choice of method in both intracapsular and extracapsular extraction is influenced by many factors. Experience is the guide in determining the procedure best suited to the individual case. It is a very difficult matter at present to say in what proportion of our cases intracapsular extraction might be successfully employed. I have no doubt that we might employ it advantageously to a much greater extent than in the past. In 1932 I hazarded the opinion that over 50 per cent of our cataract cases are unsuited to intracapsular extraction, but I may have reason in the future to modify this view in either direction.

I will not attempt an exhaustive examination of the contra-indications to intracapsular extraction.

I agree with Barraquer that, in so far as Europeans are concerned, patients should ordinarily be over 55, but this rule is not applicable to Indians and one must judge of the resistance of the zonule by the general

impression of the aging of the body tissues; in this, good judgment depends on experience.

Prominent or bulging globes, especially in fat plethoric patients, are associated with greater risk of disaster, although much can be done in moderate degrees of prominence to make the operation safer by retrobulbar injection of novocaine-adrenalin, firm pressure over the eye with a wet pack for a short time before operation, and canthotomy. It must be remembered that patients with markedly atrophic tissues are more common in the East. I have drawn attention to this elsewhere (*Repts. Govt. Ophth. Hosp., Madras*). On this account the deeply-socketed eye in a shrunken orbit is quite a feature of the Indian clinic. It is not so common in this country (Ireland) nor in other countries unaffected by excessive heat and an acute population food supply problem. Such eyes are much less liable to an escape of intraocular contents, and are eminently suitable for intracapsular extraction provided the posterior segment is in reasonably good condition. Glaucoma is a contra-indication if our technique causes a rise in tension.

If, for example, an increase in tension due to the establishment of mydriasis is not counteracted by other measures such as the retrobulbar injection, it is wiser to carry out extracapsular extraction.

If the section shows the slightest tendency to gape, when with full akinesia and anaesthesia negative pressure is established in the orbit and the globe is socketed well back, an intracapsular extraction is very risky, particularly in eyes with shallow chambers.

Subluxated lenses, traumatic cataracts, many of the complicated cataracts, and cataracts with dense membranous capsules are unsuited to the Barraquer operation although the latter types, in fact the whole hypermature group (except Morgagnian cataracts), are ideal for extraction with forceps.

In Morgagnian cataract the forceps method is quite contra-indicated, Barraquer's extraction is not really suitable, whilst expression is eminently adapted to the conditions which are usually present.

I do not favour intracapsular extraction in high or even moderate myopia if in the latter there is a record of degeneration, in known pathogenic states of corneosclera or posterior uvea, or fluid degenerations of the vitreous.

In chronic anterior uveitis of certain types, e.g., that of hyperglycæmia, it is not contra-indicated, but one must be very careful in cases of peripheral posterior synechiae. It must be admitted that when the patient is seen for the first time with a cataract fully developed it is difficult to be certain of the condition of the vitreous, but one can often obtain probable evidence of changes in consistence and other abnormal states.

Although intracapsular extraction is eminently suited to patients over 55 with apparently uncomplicated cataracts, certain cataracts falling into this group are not so easily extracted with forceps on account of the greater difficulty in pinching up a fold of the capsule, for example, in tumescent lenses and those with large sclerosed nuclei tightly filling the capsule. In the latter variety I prefer starting the lens forward with a needle and following it up (with hook or equivalent instrument in the other hand) as in a forceps extraction. Should this fail it is wheeled out with the needle as an extracapsular delivery. Morgagnian cataracts in which there has been considerable absorption of fluid are dealt with by preliminary capsulotomy with a needle and removal of the small nucleus by gliding it out on an inclined plane between two Smith's iris repositors, one behind the nucleus inside the chamber, the other outside on the cornea.

The nucleus of a burst Morgagnian cataract is dealt with in the same way, unless the nucleus is so small that a corneal keratome incision is possible; this requires good judgment. In such cases the capsular bag is subsequently removed complete with a Kalt's forceps; it comes away readily with lateral swinging movements.

Provided intracapsular extraction is not otherwise contra-indicated the important point is, whether the zonule is sufficiently weak to tear readily. Hence the age limit which Barraquer lays down but which does not apply in India. In the forceps method, if the zonule is strong enough to resist the pull on the capsule, the capsule gives way. In phaco-eresis this does not happen so readily and the pull exerted on the zonule in order to rupture it by movements of the eresiphake may be such as to cause even ciliary detachment. The vibratory explanation of zonule rupture in phaco-eresis by the Barraquer technique as described in certain publications is an elaborate chimera. Ordinarily in weak zonules the humping up of the anterior capsule into the cup when the vacuum is applied is sufficient to put drag on the peripheral capsule and rupture the zonule. If this does not occur the operator must make the necessary movements (preferably in its own plane) to rupture it. In the case of resistant strong zonules in middle-aged and young people the force necessary to effect this rupture may be too great, and should one make a start with the eresiphake in such a case it is wiser to desist and employ forceps than to risk trauma to the vitreous and ciliary body. With experience it is not difficult to know when this forbearance is called for. With the forceps the capsule will always give way before a damaging strain is put on the ciliary body.

The most disappointing thing about intracapsular extraction is the relative infrequency with which immature cataract can be removed

without unjustifiable trauma. One of the greatest difficulties in cataract work is the handling of the central immature cataracts, or any variety of cataract in which the cortex is still firmly attached to the capsule in persons with a strong zonule. This condition may threaten the individual's livelihood and it may be important to extract the lens for this or other economic reasons.

Unfortunately the eresiphake does not help us here any more than expression, delivery with forceps, or capsulotomy. In certain cases of immature cataract where the resistance of the zonule is doubtful it is possible and justifiable to try extraction with the eresiphake. If the application of the vacuum is not sufficient to tear the zonular fibres and reasonable movements thereafter do not succeed in dislocating the lens, the attempt may be abandoned by releasing the vacuum. In such an eye ripening is markedly accelerated and it may be dealt with later by capsulotomy.

Finally, it may be said that there is still some room for all methods and, where large numbers and varieties of cataracts have to be dealt with, individual cases must be treated by any method, or modification of method, which the surgeon thinks best.

Dealing with extracapsular extraction the great importance of irrigation is stressed. The author considers that the full value of this procedure is not appreciated by many operators who do not adopt a technique such as he advocates or understand the employment of vigorous irrigation. [The author refers to Western clinics; in India the method he advocates is largely practised.—E. O'G. K.] Its advantages in congenital and juvenile cataracts is pointed out. One objection to irrigation is dealt with thus: 'An objection to irrigation is sometimes put forward that it causes damage to the endothelium resulting in a persistent keratitis. With the full weight of my experience and that of my predecessors behind me, I can say that this is a bogey founded on operative clumsiness or some unrecognized factor such as a noxious irrigating fluid'.

The capsulotomy is considered in detail and the importance of obtaining an extensive aperture in the anterior capsule emphasized. The difficulty of removing a large central portion of the anterior capsule is discussed. Various methods are recommended—a capsule flap with the knife, subsequently removed by forceps, being one; capsulotomy with suitable forceps is another. The author has designed a forceps for this purpose (made by Down Brothers). The great importance of wearing operating glasses of a modern type, such as Hamblin's, is emphasized. 'Even with glasses, capsular tags may be missed by experienced operators except when set in motion by the stream of the irrigator, but without such glasses the best cataract work is hardly possible'.

In dealing with 'the section' the conjunctival suture is criticized as a means of surgical closure of the wound, nor does the bridge flap act in this way. The latter has advantages but also disadvantages, *e.g.*, greater difficulty of delivery and a greater liability to hæmorrhage into the chamber, which the author deprecates. Corneoscleral suture is held to be the only method of effecting true surgical closure of the deep wound. The author has elaborated a technique but as yet it is not sufficiently simple to be deserving of universal application. This is a serious criticism in his view. A simplification of technique is one of his tenets. A method of dealing with after-cataract with a minimum of trauma is described.

The concluding remarks may be quoted in full:

'In order to bring these observations to a close in proper perspective, it is absolutely necessary to refer, if ever so briefly, to the prevention and non-operative treatment of cataract.

Despite the fact that the surgical removal of the opaque lens with all its ritual appears to play such a prominent part in our hospital routine, we never forget that it is but a valuable makeshift which we employ, *faute de mieux*, until further investigation elucidates the various causes of cataract and enables us to eliminate them. If we assume, and the assumption is apparently supported by census returns, that cataractous changes in the lens are of greater frequency in the Madras Presidency than in Great Britain and Ireland, it is highly probable that this is related to the better conditions of the public health in these islands.

We still speak of senile cataract, although I believe, as do others, that senility *per se* is not productive of the opaque condition of the lens which is ordinarily referred to as cataractous. The true senile change of sclerosis with increasing depths of colour is not incompatible with relatively good vision. There is in fact no such thing as senile cataract, but there is cataract of unknown origin occurring in the aged. In our constant search for metabolic and other disturbances which are commonly associated with lenticular opacities, if not directly productive of them, we have not made much progress in recent years in spite of great biochemical advances. For this reason it is very difficult to devise any scheme of experimental investigation which might throw light on the preventive treatment of cataract. The steady progress of preventive medicine and biochemistry will no doubt eventually enlighten the ophthalmologist if his mental vision is not too unrecceptive.

A consideration of examples will make for clearness. I have held for some time, and recorded elsewhere, that there is a peculiar type

of cataract frequently associated with hookworm disease. In this clinical observation I have the support of my own staff, most of whom are prepared to make a diagnosis of hookworm disease by merely looking at the cataractous eye which they have learned by experience to associate with the waxy pallor, œdema, etc., of advanced ancylostomiasis. Fortunately hookworm "disease" is relatively infrequent in hookworm infection, but the toxins, which in bulk produce the clinical picture of hydræmia, anasarca and a pearly cataract, may readily, when acting in smaller quantities, start opacities in the lens which, with increasing hookworm infection or some other influence altogether, assume a progressive character. The importance of the association between hookworm disease and cataract—if it is substantiated by statistics—is obvious. One need only refer to literature on this subject (*e.g.*, Annual Reports of the Rockefeller Foundation and Annual Reports of the Public Health Commissioner with the Government of India) to realize the enormous importance of ancylostomiasis. Over 70 per cent of the population in the Madras Presidency shows hookworm infection. I doubt if the average ophthalmologist in this country (Ireland) has the faintest conception of the scale on which efforts are being made in the world outside the British Islands to combat hookworm infection, or of the economic significance of ancylostomiasis.

Hookworm infection, however, as a preventable cause of cataract, may seem to those of you who live here as of very remote interest; but we also see a very common metabolic disturbance frequently associated with cataractous changes (and, of course, with vascular changes, too), which brings our thoughts closer to those widely distributed if somewhat obscure endotoxic conditions which may well be operative in this country; such, for example, as we associate with vascular disease. I refer to hyperglycæmia, the frequency of which in southern India is probably related to the local peculiarities of diet. Limitations of time and space do not permit further excursions into the interesting problems associated with the possible prevention of cataract.

As regards the non-operative treatment of cataract I have little to say. We have tried deep intraorbital cyanide injections in incipient cataract with mixed results. We have tried drugs, dieting, ductless glands, but know of nothing which will stop the course of a cataractous process. On the other hand, I have occasionally observed the cessation of a cataractous process, which might readily have been ascribed to a specific line of treatment, had such treatment been in operation.

Considerations such as those in the earlier part of this section make the surgical treatment of cataract appear of secondary importance,

although for a long time to come, the removal of the opaque lens will make its appeal in

varying degrees to the urge of the mercenary, the craftsman, and the healer within us'.

Medical News

ASSAM GAZETTE

(The 19th June, 1934)

No. 2469 L. S. G. In exercise of the power conferred by section 11 of the Assam Medical Act, 1916 (Assam Act 1 of 1916), the Government of Assam are pleased to declare that the term of office of the following members, who have been nominated or elected to constitute the Assam Council of Medical Registration under sections 4 and 5 of the said Act, shall begin on the 11th June, 1934 :—

- | | |
|---|-------------------|
| 1. The Inspector-General of Civil Hospitals, Assam | President. |
| 2. The Director, Pasteur Institute and Medical Research Institute, Shillong | Member nominated. |
| 3. The Director of Public Health, Assam | " " |
| 4. The Civil Surgeon, Khasi and Jaintia Hills | " " |
| 5. The Chief Medical Officer, Welsh Mission Hospital, Shillong | " " |
| 6. Dr. Brajendra Nath Bhat-tacharyya, M.B. | " " |
| 7. Dr. F. C. McCombie, M.D., B.S., M.R.C.S., L.R.C.P. | " " |
| 8. Dr. Lalit Kumar Barooah, L.M.F. | " " |
| 9. Dr. G. D. Madhok, L.R.C.P. & S., L.R.F.P. & S.L.M., D.F.H., D.T.M. | " " |
| 10. Dr. Kumudini Kanta Banarji, M.B. | Member elected. |
| 11. Dr. Dibakar Hazarika, M.B. | " " |
| 12. Dr. Sarat Chandra Chakravarty, L.M.F. | " " |
| 13. Dr. Bimal Ranjan Dey, L.M.F. | " " |

THE PARKES MEMORIAL PRIZE FOR 1935

THE Parkes Memorial Prize, consisting of approximately thirty guineas in money with a gold medal, will be awarded annually to the writer of the best essay on a subject connected with hygiene.

The competition is open to the medical officers of the Royal Navy, Army, and Indian Army, on full pay, with the exception of the professors and assistant professors of the Royal Naval Medical School, Greenwich, and of the Royal Army Medical College, London, during their term of office.

The subject for the essay for the 1935 Parkes Prize will be optional, each competitor being allowed to select any subject dealing with naval or military hygiene. All essays submitted will receive equal consideration, with the proviso that the subject chosen must have a direct bearing on naval or military hygiene or on both.

Essays to be sent in to the Secretary of the 'Parkes Memorial Fund', Royal Army Medical College, Millbank, S. W. 1, on or before the 30th June, 1935. Each essay to have a motto, and to be accompanied with a sealed envelope bearing the same motto and containing the name of the competitor.

The committee reserve the right to withhold the award should, in the opinion of the assessors, no essay attain a sufficiently high standard of merit.

THE ELEVENTH ALL-INDIA MEDICAL CONFERENCE, 1934

THE Eleventh All-India Medical Conference will be held in Delhi during the ensuing Christmas week. Subjects concerning the vital interest to the medical profession in India, *e.g.*, Rural Medical Relief, Health Insurance Scheme, Indian Medical Council Act, etc., will be discussed in the conference. The scientific section of the conference and the exhibition will no doubt be of special interest to all medical men and women. In order to make this conference thoroughly representative of the medical profession of India, it is requested that all members of the profession should join the conference and take part in the deliberations.

For particulars please write to the organizing secretary, Eleventh All-India Medical Conference, D. M. A. House, Darya Ganj, Delhi.

A CENTENARY APPEAL FOR THE MEDICAL COLLEGE HOSPITALS, CALCUTTA

THE following appeal has been issued by Sir Bijoy Prosad Singh Roy, Minister for Local Self-Government, Bengal, on behalf of the Medical College Hospitals, Calcutta :—

The Calcutta Medical College will be celebrating its centenary early next year. It was established by Lord William Bentinck by an Order-in-Council dated 28th January, 1835. About fifty years ago the number of indoor cases treated were 2,325, outdoor cases 35,484. The confinements in the hospital were only 55. The corresponding figures for 1933 were indoor cases 15,931, outdoor 162,243 and over 2,000 confinement cases. Such has been the growth of the Medical College Hospitals from its small beginnings when the first clinical hospital attached to the College consisted of 30 beds and a small outpatient dispensary. To-day the Medical College and its associated hospitals have expanded into an immense institution dealing with practically all branches of modern medicine and providing incalculable benefit not only to Calcutta but also to Bengal and even beyond. During this 100 years many distinguished men attached to the College have made notable contributions to the advancement of medical science particularly as regards tropical diseases.

Much money is now needed to modernize the Calcutta Medical College Hospitals and among its many pressing requirements is the abolition of the present unsatisfactory arrangements in the emergency rooms by the construction of a proper casualty department and wards with up-to-date equipment and adequate nursing arrangements. The recurring expenditure of this department amounting to Rs. 25,000 per annum the Government have decided to bear, provided the capital cost for the building and equipment can be raised through public donations. Even this will not suffice to bring this institution to the standard of a modern hospital organization. Much still remains to be attained if it is to maintain its position as a pioneer. An outstanding example in this respect is its deficiency in radium.

In matters of public charity, especially with regard to medical aid and medical education, Bengal has

been in the past a leader to the rest of India, and has built up a tradition of splendid and efficient service. The services of Bengal in this direction have received widespread appreciation. The Calcutta Medical College and Hospitals now appeal to the generosity of Indians and Europeans alike, and also to the several generations of medical men who have passed out through their doors with success, and who now hold prominent positions in various spheres of life in India. The financial needs are very urgent, and, despite the present financial stringency, we do not believe that this appeal will be in vain. There is no subject which should be closer to the heart of a country than the health and welfare of its people.

Donations may kindly be sent either to the Treasurer of the Imperial Bank for credit to the Medical College Centenary Fund or to any of the following gentlemen:—

Sir Badri Das Goenka, *Kt.*, *C.I.E.*, 145, Muktaam Babu Street, Calcutta; Sir Hari Sankar Paul, *Kt.*, 1 and 3, Bonfield Lane, Calcutta; Kumar H. K. Mitter, 1, Jhamapukur Lane, Calcutta; Mr. J. N. Basu, Temple Chambers, 6, Old Post Office Street, Calcutta; Mr. Sitish Ch. Mitter, 2, Loudon Street, Calcutta; Mr. Sudhansu K. Mitter, 34/1, Elgin Road, Calcutta;

Dr. Charubrata Ray, 13, Hindusthan Road, Calcutta; or Lieut.-Col. T. C. Boyd, Principal's House, Medical College, Calcutta.

The signatories to the appeal include:—

Bijoy Prosad Sinha Roy, Rabindra Nath Tagore, Prodyot Kumar Tagore, Deva Prosad Sarbadhikary, M. N. Roy Chowdhury of Santosh, S. C. Nandi of Kachumbazai, Nilratna Saikar, E. C. Benthall, Badri Das Goenka, Kedar Nath Das, Hari Sankar Paul, Hasan Subhawardy, Upendra Nath Brahmachari, S. N. Mallik, Nalini Ranjan Saikar, W. M. Craddock, Shiyama Prosad Mukherji, S. D. Gladstone, C. G. Arthur, Chas. G. Cooper, H. H. Burn, P. N. Tagore, J. N. Basu, Moongtungal Thaparia, Arthur Moore, Tusar Kanti Ghosh, Promotho Nath Roy, Eric Studd, Haridhan Dutt, H. K. Mitter, Kamala Ranjan Roy, J. Reid Kay, G. D. Birla, D. P. Khaitan, D. C. Ghosh, Satis Chandra Mitter, M. A. H. Isphani, D. J. Cohen, Kumar Krishna Kumari, M. A. Momin, Bimala Ch. Law, A. K. Fazlul Haq, S. K. Mitter, Ratan Mohan Chatterjee, D. P. Goli, Thomas Crawford Boyd, R. Knowles, L. M. Banerji, K. K. Chatterji, E. H. Vere Hodge, A. A. E. Baptist, Ekendra Nath Ghosh, N. Pan, P. Chatterji, K. S. Mitra, M. Ahmed, Jawalapiasat Bhartia and Kanailal Jatia.

Current Topics.

Serological Diagnosis of Latent Malaria

By E. D. W. GREIG, *C.I.E.*, *M.D.*, *D.Sc.*, *F.R.C.P.* (Edin.)
C. E. VAN ROOYEN, *M.B.*, *Ch.B.* (Edin.)

and

E. B. HENDRY, *B.Sc.*

(From the *Lancet*, Vol. I, 30th June, 1934, p. 1393)

A. F. X. HENRI has demonstrated the property of malarial sera to flocculate solutions of iron methyl-arsenate and melanin pigment contained in ox choroid membrane. The former test he termed 'ferro-flocculation'; the latter, which was found to be more sensitive, 'melanoflocculation'. Henry maintained that the phenomenon was due to the interaction of melanin pigment, which behaved as an antigen, and a corresponding antimelanagglutinin developed in the sera of malarial subjects. He regarded the reaction as specific for malaria and of value in the recognition of the latent infection when parasites were absent in peripheral blood. Several continental workers have confirmed the latter observation and we have obtained similar results.

A number of difficulties have however been encountered owing to the unsuitability of crude aqueous suspensions of ox choroid membrane for use as antigen, arising from its instability and the large amount of ox tissue derivatives contained in it other than melanin pigment. The test as employed by Henry merely signifies that the serum examined has or has not agglutinated the antigen in a single low dilution. No provision was made for assessing the degree of positivity exhibited by different sera or the same specimen at various stages during the course of an illness. We have attempted to overcome these difficulties by the substitution of human hair for ox choroid membrane as a source of pigment, and by alterations in technique.

TECHNIQUE OF THE NEW TEST

The melanin pigment solution is derived from human hair by hydrolysis with 50 per cent HCl, followed by concentration *in vacuo* and purification by dialysis in a collodion membrane. This has been found to give a pure and stable suspension of pigment. A set of nine dilutions of patient's serum is prepared ranging from 1:2 to 1:512 in distilled water. To each is added an equal volume (0.4 ccm.) of pigment solution, and the series is incubated at 37°C. for 5½ hours before the

reading is taken. Positive results are observed as white granular precipitates forming at the foot of the tube; the degree of positivity is determined by noting the highest dilution of patient's serum showing precipitation.

The rise and fall of the reacting principle in human malarial sera with melanin pigment may thus be quantitatively ascertained during an attack. The method was tested on benign tertian infection induced in cases of G.P.I. Preliminary observations showed that the reaction appears about the 5th to 7th day following infection, although no parasites may be seen at this stage and the patient is afebrile. The maximum titre of 1:128 is reached about the 4th week and then rapidly declines following the administration of drugs. Control tests on 129 different non-malarial sera gave only two non-specific positive results.

It is probable that the phenomenon is not due to the interaction of antigen and antibody, for it can be shown that positively reacting sera may be inactivated by heating to 55°C. for half an hour and that the repeated immunization of rabbits with melanin pigment fails to produce an agglutinin response. The occurrence of a reaction with positive sera and dioxypheylalanine shows that the reaction is due to the melanin and not to any other substance.

Observations on the lipid phosphorous content of the serum during the course of the infection show that its amount tends to vary inversely with the reacting titre of the serum to melanin pigment. We suggest that the term melanoflocculation test should be dropped and melanoprecipitation reaction substituted.

Typhoid Vaccine: Potency and Virulence

(From the *Lancet*, Vol. II, 28th July, 1934, p. 203)

RECENT years have witnessed an exuberant growth in our knowledge of the antigenic structure of bacterial cells. The resulting literature offers a formidable meal even to the professed immunologist, who must perforce attempt its digestion. But those whose interest lies on the practical rather than on the theoretical side, noting that exuberance has in this case justified its literal significance of fruitfulness, will desire to master those elements of the newer

knowledge that have an immediate bearing on the practical problems of immunization. In our present issue Dr. Felix and Miss Pitt record their latest observations on the factors involved in the virulence of the typhoid bacillus as tested in mice. In earlier studies they showed that strains of high virulence have, in the living state, the curious property of being relatively inagglutinable by sera that contain a high titre of antibodies acting on the 'O' somatic antigen, which is one of the most characteristic components of 'smooth' strains. In their present paper they show that this inagglutinability is associated with the possession of an additional antigenic constituent, that can be clearly differentiated from the ordinary 'O' antigen by selective absorption of the corresponding antibodies. Mice immunized with a vaccine containing this additional antigen in an active form are rendered resistant to the injection of highly virulent bacilli. Mice immunized with a vaccine from which this antigen is absent remain susceptible to virulent strains. Antisera prepared by immunizing rabbits with living virulent bacilli protect mice against infection with these strains; antisera prepared by immunizing rabbits with killed virulent bacilli, or with avirulent smooth bacilli, have no such protective action. It would seem that heat-killed virulent bacilli have suffered an impairment of the antigenic potency of the particular component associated with high virulence sufficient to inhibit its capacity for inducing efficient antibody formation in the rabbit, but insufficient to prevent the induction of active immunity in the mouse. If a relatively avirulent strain is used for testing—in which case the lethal dose of living organisms does not fall far below the lethal dose of killed bacteria, so that death must be regarded as resulting from toxæmia rather than from bacterial invasion of the tissues—it is found that the ordinary antisera, containing the 'O' antibody, are at least as protective as the sera obtained by immunization with living virulent bacilli. The new antigen and its corresponding antibody would thus seem to be concerned particularly with the reactions that inhibit tissue invasion.

Dr. Felix has clearly added another observation of great practical importance to those that already stand to his credit in this field. Whether the sharp distinction that he draws between this new antigen, as determining virulence, and the ordinary smooth somatic antigen, as being mainly concerned in toxicity, is fully justified, and whether the facts that he has demonstrated in the case of the typhoid bacillus have analogies in other bacterial species, only the future can show. The essential significance of his findings lies in the demonstration that it is not enough to prepare our vaccines from smooth strains, as we had already learned to do, but that one smooth strain differs from another in its antigenic structure, and that we must select smooth strains possessing the right kind of antigen if we wish to protect against attack by strains of high virulence.

These observations of Felix and Pitt offer an explanation of the interesting results recorded by Perry, Findlay, and Bensted in a series of reports from the pathological department of the Royal Army Medical College. These workers had already been led, on the basis of a considerable series of experiments, to the conclusion that virulence for mice, rather than mere smoothness in the usually accepted sense, offers the best criterion of immunizing power. In their latest paper they offer additional and more detailed evidence in support of this view, showing that none of the commonly accepted tests for smoothness—colonial appearance, stability in saline, a negative Millon reaction, or the agglutinability of killed cultures by an 'O' antiserum—can be relied upon as a proof of immunizing value. They note, in agreement with the findings of Felix and Pitt, that their virulent and highly immunizing strains are, in the living state, relatively inagglutinable with an ordinary

'O' antiserum, though one at least of their agglutinable strains has shown a quite definite immunizing capacity. Those who have a liking for tradition will learn with pleasure that the famous 'Rawlings' strain of typhoid bacillus, which has played so honourable a part in the history of antityphoid inoculation, has, after a temporary lapse into senility and ineffectiveness, been successfully rejuvenated, and is now the most potent of the tested strains.

The Significance of Leucorrhœa

By ALBERT SHARMAN, M.D., B.Sc., M.C.O.G.

(From the *Medical Press and Circular*, Vol. CLXXXIX, 4th July, 1934, p. 10)

LEUCORRŒA may be defined as that degree of vaginal discharge (other than blood) sufficient to soil the clothes or necessitate the use of a sanitary napkin, and considered by the patient as an appreciable departure from her normal state. A small quantity of vaginal discharge is normal, and its features are best studied in the healthy virgin. It consists of a thick, white, highly acid fluid (pH 4.2 to 4.8) derived via the vaginal epithelium. The latter contains no glands, and therefore the word 'secretion' is, strictly speaking, a misnomer. The acidity is due to lactic acid, which results from the utilization of glycogen, present in abundance in the epithelial cells, either by the action of Döderlein's bacilli or by non-bacterial enzymes. Microscopic examination of the discharge shows a homogeneous bacterial flora of Döderlein's bacillus and desquamated vaginal epithelium. The cervical secretion is thick, mucoid and clear, normally scanty in amount, and is constantly and definitely alkaline, ranging in pH from 8.0 to 9.0. The secretion elaborated by the uterine endometrium is somewhat like water in colour and consistence, is alkaline in reaction, and of very little importance clinically.

Leucorrhœa is a very common complaint, and is most frequent in married, parous women. It is also encountered in married nulliparæ, in virgins and in children. The very mild degrees of excessive discharge, pre-menstrually or temporarily during conditions of depressed general health, are of little clinical moment. Leucorrhœa is a symptom producing frequently much discomfort and distress, and by reason of its profuseness or persistence may make life miserable. Many women, however, are not anxious to discuss the symptom with their medical practitioner until matters reach such a stage that, despite their own efforts at treatment, the persistence of discharge compels them to seek advice. This delay, coupled with the fact that many women regard quite a considerable amount of vaginal discharge as normal, has the effect of frequently making the complaint one of long duration, when advice is first sought. It is, therefore, of importance that the general practitioner should have a clear understanding of the pathogenesis and treatment of the condition.

SOURCES OF DISCHARGE

An excessive discharge *per vaginam* may reasonably arise from any one of three sources—vagina, cervix or uterus—and it is essential to consider the possible lesions and factors which may be productive of discharge from each of these sites.

Least commonly is the corpus uteri responsible, and in these cases polypi, submucous fibroids or endometrial carcinoma may be found. Infection of the uterine cavity as a source of leucorrhœa is extremely uncommon. This has been conclusively proved by histological and bacteriological examination of the endometrium in a large number of cases. The general view that endometritis is a common condition and is frequently the cause of leucorrhœa is quite erroneous. Very rarely indeed is the Fallopian tube the source, but a watery discharge *per vaginam* may be encountered in tubal carcinoma.

Cervical infection following childbirth, abortion or gonorrhœa is much the most frequent cause. The pathology responsible for these discharges consists of redundant hypersecreting glandular tissue, sometimes associated with insufficient drainage of the secretion. The commonest organisms found (excluding gonococci) are diphtheroid bacilli, coliform bacilli, staphylococci, varied anaerobes and Gram-positive diplococci. On inspection, the cervix may be seen to be eroded or lacerated, or hypertrophied or ulcerated. Chronic endocervicitis is very frequently present. The lacerated and infected cervix may be the precursor of carcinomatous change, and where there is suspicion that the latter may be present, biopsy is essential. Syphilitic or tubercular ulceration of the cervix is uncommon, but this possibility should be borne in mind. A tubercular cervical lesion is rarely primary, but may be associated with tubal or uterine tuberculosis.

The vagina is a frequent source of leucorrhœa, most commonly the discharge being of infective origin and secondary to endocervicitis, but sometimes non-infective. Rare pathological conditions in this site which may produce the symptom are carcinoma, benign tumours, tuberculosis and adenomatosis vaginæ. Probably the most common form of discharge in the infective group is that due to the *Trichomonas vaginalis*. Although this parasite was first described by Donné in 1836, very little attention was paid to it as a pathogenic agent and as a cause of leucorrhœa until recent years. A considerable literature on *Trichomonas vaginalis* vaginitis has now appeared since 1928, particularly in America. The *Trichomonas* is a flagellated protozoon which varies considerably in size, being usually larger than a polymorphonuclear leucocyte, but smaller than an epithelial cell, and is best studied by means of hanging-drop preparations or by diluting a drop of vaginal discharge with a drop of normal saline on an ordinary glass slide. The organisms may readily be seen on account of their characteristic movements with the ordinary high-power lens. The discharge in this condition is almost invariably copious, watery, yellowish, finely frothy or foamy, and irritating. The vulva is frequently inflamed, and portions of the vaginal wall are covered by small, punctate, hyperæmic or granular areas. With the exception of the *Trichomonas*, vaginal parasites as a cause of leucorrhœa are not of much importance. *Oxyuris vermicularis* may be found, especially in the vagina of neglected infants. Fungus infection of the vagina is rarely encountered. A simple catarrhal vaginitis may be productive of excessive discharge. In women who have passed the menopause, this may be very persistent, and its causation is closely associated with the great diminution or complete loss of the vaginal defensive power, which is intimately related to atrophy of the epithelium, loss of glycogen and scantiness or disappearance of Döderlein's bacillus.

Leucorrhœa in young virginal women is often a difficult problem in practice. Mild degrees of this are not uncommon, and the condition readily clears up on general medical or tonic treatment and, indeed, with no treatment whatsoever. When excessive and persistent it becomes very disturbing, liable to produce neurosis, and requires careful investigation.

With a few rare exceptions, virginal leucorrhœa may be divided into two groups: (1) infective, and (2) non-infective. In the infective group the majority of the cases are *Trichomonas vaginalis* infections, although such conditions as yeast or monilia vaginitis may be encountered.

Among the non-infective cases there is a group in which hormonal disturbance is strongly suggested, either by the individual's make-up or by gross menstrual dysfunction, such as prolonged or almost complete amenorrhœa. In other cases there is no obvious evidence of endocrine imbalance and no distinctive clinical features are noted. Sometimes the complaint dates from puberty, and excessive discharge may be noted before menstruation first commences. The laboratory

findings in the two categories of cases of leucorrhœa are summarized in the following table:

	Non-infective	Infective
Secretion	.. White, viscid, cheesy.	Grey-yellowish, fluid, frothy.
Smear	.. Grade I flora (epith. cells and Döderlein's bac.)	Grade II or III flora. (Pus cells, trichomonas and mixed bacterial flora).
Culture	.. Döderlein's bacillus.	Profuse, mixed.
Reaction (average pH)	4.4 (4.2 to 4.7).	5.6 (4.9 to 6.0).

Vaginal discharge may be encountered in children, when it is frequently due to gonococcal vulvo-vaginitis. The susceptibility of the vagina in these cases is probably dependent on the absence at this stage of any protective vaginal mechanism; for it has been shown by Cruickshank and Sharman that after the first month of life, throughout childhood, until puberty, the bacterial flora of the vagina is sparse and varied, glycogen is absent from the cells of the vaginal epithelium, and the normal discharge is scanty or absent, and, when measurable, alkaline in reaction. Contrasted with this, it is to be noted that gonorrhœal vaginitis does not occur in the first two to three weeks of life, when a simple homogeneous flora of Döderlein's bacilli associated with a highly acid non-purulent 'secretion' is present in the infant.

Leucorrhœa in pregnant women is not uncommon. Cruickshank and Baird (unpublished) have shown that in a series of pregnant women complaining of vaginal discharge, while *Trichomonas vaginalis* infection was not uncommon, in 39 per cent of the total cases the evidence was that the symptom was due entirely to an increased amount of the normal physiological 'secretion'. The causative factor in this process is hormonal; and is probably due to the progressively increasing elaboration of oestrin during pregnancy.

INVESTIGATION

Investigation of a case of leucorrhœa should consist firstly of inspection of the vulva, when the presence of redness or excoriation of the labia, or injection of the orifices of Bartholin's duct or of the urethra should be noted. The naked-eye characters of the discharge should be observed as to colour and consistence. In simple vaginitis it is usually thin or semi-purulent; in venereal disease it is thick and irritating; and in malignancy it is frequently watery, malodorous and blood-stained. When thin, yellowish and finely frothy, it suggests *Trichomonas vaginalis* infection. Fresh-drop examination, in saline, of the discharge will reveal these flagellates when present.

In all cases of doubt as to the nature and source of leucorrhœa, the reaction (H-ion concentration) should be estimated. This is very simply done by the use of a colorimetric apparatus such as the capillator (British Drug Houses) which gives information of much value. If the pH of the discharge is less than 5.0, it can be assumed with certainty that the discharge is of purely vaginal origin. A highly acid reaction such as this excludes gonorrhœa. On the other hand, if the pH of a vaginal discharge is greater than 6.0, it points strongly to the probability that the discharge is of cervical origin. A direct smear should be made and stained for bacteriological examination. The recognition of particular types of organisms present in the vagina is seldom of much value, especially in the non-virgin; but it is more convenient and helpful, in judging the nature of a discharge, to follow the plan of recognizing three types of bacterial flora, or three grades (I, II, III) of 'cleanliness' (reinheitsgrad). Grade I consists of a homogeneous bacterial flora of Döderlein's bacillus, occasionally accompanied by yeasts and a highly acid (pH 4.0 to 4.4), whitish, cheesy secretion consisting of desquamated vaginal epithelium. Grade III, corresponding to Döderlein's pathological

flora, contains several types of bacteria, such as diphtheroids, enterococci, staphylococci, vibrios and coliform bacilli, and is accompanied by a less acid and even alkaline discharge (pH 5.6 to 7.6). Grade II is intermediate between these two. Döderlein's bacillus being present in association with one or more other bacterial types, while the pH of the secretion usually varies from 4.6 to 5.6.

The vaginal wall may show evidence of inflammation. The cervix should then be inspected for the presence of erosion, ulceration, laceration or ectropion of the lips. When the cervix is infected a smear should be made and examined for the presence of gonococci. A careful bimanual pelvic examination will give information as to the condition of the uterus, tubes and ovaries. Only when other causes can be excluded and an intra-uterine cause suspected, should the cervix be dilated and the uterus curetted.

TREATMENT

Treatment depends largely on the diagnosis of the source of the discharge. When this is due to a neoplasm, involving uterine body or cervix or the vagina, it must be removed. Where cervical infection is present it should be treated by cauterization or excision of the infected area or by amputation of the cervix. In cases of vaginal infection treatment consists in the local application of antisectics to the vaginal wall, generally in the form of douches or instillations. *Trichomonas vaginalis* vaginitis is very resistant to treatment, which must be thorough and persistent. Iodine, acriflavine, biniodide of mercury and tincture of green soap are probably the most satisfactory agents. Particular care should be paid to treatment immediately after menstruation, on account of the tendency to recurrence at this time.

With regard to cases of discharge of non-infective origin, local treatment is not likely to influence the condition. Theoretically, hormone therapy might prove of value; but we have tried many preparations and are not satisfied with their efficacy in this direction. Numerous varieties of tonic and vitamin preparations have been given, but the results have been inconstant and on the whole unsatisfactory. General medical treatment, however, may be employed. The tendency in non-infective cases to spontaneous remission and cure must be taken into account in assessing the value of any treatment. The important point is that it should not follow along the therapeutic lines necessary in cases of the infective category. It must always be borne in mind that leucorrhoea is not a disease, but an expression of disease, that is, a symptom, and that the precise exciting cause must be determined. It is useless to perform a dilatation and curettage of the uterus in the great majority of cases, for it is based on an erroneous conception of the source of the discharge, and may even be followed occasionally by infection. It must, therefore, be emphasized that in deciding the method of treatment in every individual case, both a careful clinical examination and a full laboratory examination of the discharge are essential.

Pulmonary Tuberculosis after Sunbaths

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and

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(Abstracted from the *British Medical Journal*, 7th July, 1934, p. 15)

In view of our opinion from the experiences gained from this clinical study we venture to draw the following conclusions:

1. It is dangerous for anyone who has had hæmoptysis, especially if recent, to sunbathe until tuberculosis of the lungs has been excluded by a thorough examination, including an x-ray examination of the chest.

2. It is inadvisable for people who have recently lost weight, or who are feeling abnormally tired, or who have other suspicious symptoms to sunbathe without the same precautions.

3. Sunbathers who feel tired or feverish, or who perspire at night after a sunbath, should take their temperature, and, if it is above 99°F. in the evening, no more sunbaths should be attempted until they have been passed as fit.

[In view of the popular theory regarding the value of unlimited exposure to the effect of sunrays, particularly in this disease, the conclusions arrived at by these writers should be of interest to medical men in this country.—Editor, I.M.G.]

Glaucoma

By H. B. STALLARD, M.A., M.D., F.R.C.S.

(From the *Practitioner*, Vol. CXXXII, May 1934, p. 573)

GLAUCOMA is the term applied to a complex group of ocular conditions the distinctive feature of which is a rise of intra-ocular pressure. For clinical convenience glaucoma is classified as primary and secondary, and either of these groups may culminate in acute congestive manifestations or progress in an insidious chronic state from the initial symptoms and signs to the final stages of absolute blindness and pain. An intermediate stage between the acute and chronic states is described by some authors as 'sub-acute', but as such is within the fluctuating bounds of this disease it seems to me that this does not merit a separate label of classification.

Pathology

In a limited space it is impossible to touch upon the fringe of the complex ætiological problems of glaucoma other than briefly. A mass of experimental and clinical work has been done in attempts to elucidate the cause of primary glaucoma, and although many valuable contributions to this subject have been made the truth still evades us. Elliot described the filtration angle as the 'cockpit' of glaucoma and the cupped optic disc as its 'graveyard'. An appreciation of the structure and function of the tissues in the vicinity of the filtration angle is essential to an understanding of many of the features of glaucoma. The balance between the production and drainage of the intra-ocular fluid, the part played by the intra-ocular blood pressure and blood volume, the distensibility and compressibility of the ocular tunics, the physical states of the vitreous and lens, the hydrodynamics of moving intra-ocular fluids, the effects upon the ocular contents of certain abnormal chemical constituents in the blood, toxins, hormones and the interaction of the sympathetic nervous system are among some of the important problems concerned in the solution of the cause of glaucoma. Controversy persists about the manner in which the intra-ocular fluid is formed and drained from the eye. Probably it is produced by a process of filtration through the capillaries of the ciliary body and secretion through the ciliary epithelium: the fluid destined for the anterior chamber is believed to be formed from the pars plicata of the ciliary body and that which passes into the vitreous from the pars plana. The fluid circulates forward behind the iris, through the pupil and into the anterior chamber and also some passes posteriorly into the vitreous. Drainage is probably effected in the filtration angle by a combination of suction by the backward and inward displacement of the scleral spur on contraction of the longitudinal and circular fibres of the ciliary muscle and by the osmotic pressure exerted in the canal of Schlemm, which is in intimate communication with a deep scleral plexus of veins. Relaxation of the ciliary muscle allows the scleral spur to move forwards and outwards again and the ligamentum pectinatum by its elastic recoil

to become approximated to the filtration angle. It is probable that some drainage takes place along the perivascular lymphatic sheaths of the central retinal vessels at the optic disc. Aqueous fluid entering the open anterior crypts of the iris is drained along the perivascular lymphatics of the iris stroma.

The essential cause of an increase of intra-ocular pressure is obstruction to drainage at the filtration angle. In acute congestive glaucoma, this is effected by oedema and turgidity of the body and engorgement of the iris, in chronic glaucoma by the swelling of the vitreous or the lens pressing forward the iris root and ultimately causing this to adhere to the posterior surface of the periphery of the cornea. The production of a vascular crisis leading to engorgement of the capillaries of the uveal tract will initiate a rise of intra-ocular pressure. Such a state of affairs has been produced experimentally by Duke-Elder, who, by raising the intra-ocular pressure above that in the ophthalmic artery for a variable duration, found that within 30 seconds of releasing the pressure there was vaso-dilatation of the iris vessels, increased permeability of the capillaries and a histamine-like substance in the aqueous. By stroking the iris with an intra-ocular cannula similar events accompanied by a rise of intra-ocular tension were observed. Duke-Elder explains the acute vascular crisis, increased permeability of the intra-ocular vessels and destructive rise of intra-ocular pressure as due to the liberation of histamine and the dissemination of its influence over the uveal tract by a system of axon reflexes. The instillation of histamine into the conjunctival sac of a cat will cause a rise of intra-ocular pressure and a vaso-toxic substance has been obtained from the aqueous in acute glaucoma and is probably related to histamine. Some cases of glaucoma are comparable to an oedema of the uveal tract. Maynard reported 20 cases of glaucoma in epidemic dropsy in Calcutta.

Anatomical factors disposing to glaucoma are a small globe, rigidity increasing with age, prolongation of the ciliary processes allowing the lens to move forward, increase in size of the lens which continues to grow after the rest of the eye has ceased to enlarge, and sclerosis of the ligamentum pectinatum. Hereditary and familial predisposition plays a part in some cases. Infantile glaucoma (buphthalmos) is due to defective development of the filtration angle and its structures. There is a faulty line of iris cleavage and the canal of Schlemm may be absent.

These are by no means all the facts implicated in the aetiology of glaucoma. In the early stages of the disease it is impossible to detect any histological changes by any methods at our disposal to date. The material available for examination is mainly eyes badly damaged by long-standing disease. In the earlier stages the iris root is applied to the posterior aspect of the periphery of the cornea, but can be separated from it. Aqueous is absorbed through the iris crypts and from the stroma passes through the ligamentum pectinatum into the canal of Schlemm. Later adhesions occur, but drainage is still effected along the iris stroma. Finally, the iris becomes adherent, atrophic, bunched up with a semi-dilated pupil and no absorption takes place through the crypts. Ectropion uveæ and the formation of new vessels on the anterior surface of the iris follow. Atrophic changes also occur in the ciliary body, the ciliary processes becoming drawn out and hyaline deposits occurring in the sub-epithelial connective tissue. The choroid is flattened and atrophic and there is perivascular lymphocytic infiltration around the venæ vorticosæ and proliferation of the living endothelium. Degenerative changes occur in the nerve fibre and ganglion cell layers of the retina, and the lamina cribrosa becomes displaced backwards, producing cupping of the optic disc. Through lack

of adequate nutrition the lens becomes opaque and finally the eye is blind and painful.

Secondary glaucoma is an event in a number of intra-ocular diseases. Some of the more important of these are inflammation of the anterior part of the uveal tract, traumatic cataract, dislocation of the lens, intra-ocular hæmorrhages and neoplasms, certain post-traumatic and post-operative states, in fact, any pathological condition which impedes the drainage of the intra-ocular fluid from the filtration angle by mechanically blocking it.

Clinical features and diagnosis

Symptoms.—The necessity for the early recognition of glaucoma is paramount, and like other surgical emergencies, it should be ever in the forefront of the practitioner's mind. Tragedy and disaster follow in the wake of a missed diagnosis. The greatest care and patience must be expended in eliciting the history, and often this is indefinite and vague. Any person in the fifth, sixth and seventh decades of life complaining of neuralgic pain in the eye or its vicinity requires the most conscientious investigation of his symptoms and physical signs. In a typical case the pain is neuralgic in type; it is felt in the affected eye, the frontal, temporal and malar regions, and may radiate to the vertex; its onset is generally in the early morning after rising, passing off in a few hours as the patient moves about, and returning later in the day towards evening when he is fatigued, to be eventually relieved by sleep. The severity of the pain varies from a mild headache to the agonizing pain which prostrates the victim of an acute attack of glaucoma and causes him to vomit, become collapsed and have an irregular pulse. During an attack of pain the vision is impaired owing to corneal oedema, objects appearing 'misty', 'steamy', or 'foggy'. For the same reason lights are surrounded by 'rainbow fringes' or 'haloes'. Occasionally 'blue flashes' are noticed during a rise of intra-ocular pressure. The character of some sufferers becomes appreciably changed, they show irritability of temper, are depressed, introspective and difficult to reason with. I have known a man's temper and disposition agreeably reversed after a trephine operation.

Signs.—The incidence is slightly higher in women than in men, and the former are more liable to an attack of acute congestive glaucoma than the latter. Jews, Egyptians and certain races of Negroes are more prone to this disease than other nations. Glaucoma is prevalent in India. In some instances a familial predisposition to glaucoma is of a simple dominant character, continuous in descent and transmitted by both sexes. Rossi, working on anthropological measurements, states that the glaucoma patient corresponds nearly to the brachycephalic Alpine race. The disease is more prevalent in persons with small corneæ and small globes such as hypermetropes but the myope is by no means immune. In primary glaucoma the anterior chamber is shallow and the periphery of the iris is approximated to the posterior aspect of the cornea, narrowing and partly occluding the filtration angle. In the early stages of the disease the pupil is round and active and the iris crypts and stroma normal. In acute congestive glaucoma the pupil is semi-dilated, oval and inactive owing to the compression of ciliary nerves by the increased intra-ocular pressure and to the vascular engorgement and oedematous condition of the iris and ciliary body. In the late stages of chronic glaucoma the pars iridica retinae is drawn round the pupil on to the anterior surface of the iris, forming a chocolate-brown ring with an irregular outer border, so-called ectropion uveæ. The iris stroma becomes atrophic and flattened, and new vessels appear on its anterior surface.

When the intra-ocular pressure is raised the cornea becomes hazy from oedema of the epithelium and the substantia propria. In the higher degrees of pressure

small vesicles form in the corneal epithelium and may rupture. The cornea in an acute attack of glaucoma has the appearance of ground glass, is dull and lustreless. Associated with this there is marked congestion of the conjunctival and ciliary vessels in the vicinity of the corneo-scleral junction, the lids are oedematous, the globe is tender and feels stony hard on palpation. The intra-ocular pressure can be estimated clinically in two ways: (1) by digital examination with the forefingers placed on the upper lid over the globe, when the eye is closed, and used in the manner of palpating for fluctuation, and (2) the employment of the Schiotz tonometer. The former is of value only as a rough estimate of the grosser changes in intra-ocular pressure, for even with considerable experience it is difficult to detect by this method small but nevertheless significant rises in intra-ocular pressure. The Schiotz tonometer is by no means an instrument of scientific perfection and accuracy, and at the best it gives a rough estimation of the compressibility of the globe, but it is useful for the purpose of comparison with readings taken at intervals and it affords a more exact standard than digital examination. A few drops of holocaine, 1 per cent, in the presence of a little weak acetic acid, are instilled into the affected eye. The lids are retracted and held over the upper and lower orbital margins by the operator's forefinger and thumb in such a manner as not to cause any pressure on the globe. The patient is directed to look straight up to the ceiling and not to squeeze or move his eye. The tonometer is gently applied to the cornea and readings recorded with several weights applied to the piston. Owing to daily variations in the intra-ocular pressure in glaucoma it is well in a suspected case to record readings between 9 and 10 a.m. and 5 and 7 p.m. or at such other times as may appear necessary from the facts of the case. The condition of the intra-ocular pressure is the clinical feature of primary importance, and chiefly on this rests the conduct of the case. It is the earliest sign in glaucoma, appearing before any other change. During sleep it rises, culminating in the early morning and lessening with muscular exercise during the day. Troncosco's gonioscope is an instrument which used with a contact glass over the cornea and sclera enables the surgeon to examine the state of the filtration angle magnified by 32 diameters, and on the findings to determine the mode of treatment to be tried.

In the prodromal stages of glaucoma there is a delay in the development of dark adaptation, a dulling of the sensitivity to dim light and a slowly rising light minimum sense. Special apparatus is necessary to record this alteration in the light sense and is outside the scope of routine clinical application. Later events show changes in the field of vision, such as crescentic enlargement of the blind spot, defects in the nasal part of the field, paracentral scotomas, generalized contraction of the peripheral field of vision and, finally, loss of central vision and blindness. Cupping of the optic disc has already been referred to as the 'graveyard' of glaucoma (Elliot). To wait for it to appear as a physical sign is analogous to waiting for the autopsy. The pallor of the optic nerve head, which so often accompanies this sign, is a testimony to the death of nerve fibres and is an unfavourable prognostic sign.

The diagnosis of secondary glaucoma demands a wide knowledge of ophthalmology and the pathological states that may produce a rise of intra-ocular pressure. The employment of the slit-lamp and corneal microscope in the diagnosis of early cases has often revealed changes which suggest that the glaucoma is secondary in nature and not primary, as was at first suspected by other clinical methods of examination.

In secondary glaucoma the anterior chamber is sometimes deeper than normal owing to the accumulation of aqueous rich in colloids that cannot drain

by osmosis through the normal channels of exit from the eye. Blood, pus and soft lens matter in the anterior chamber may suffer a similar fate. Iritis, cyclitis, cataract, dislocated lens, vitreous and choroidal haemorrhages, intra-ocular neoplasms, central vein thrombosis and diabetes under insulin treatment are among some of the more important pathological conditions to be searched for.

A careful differentiation of primary and secondary glaucoma is essential in deciding upon the treatment of a case, particularly is this so in iritis in which the pupillary margin becomes adherent to the lens capsule, rendering the pupil irregular in outline and obstructing the free passage of aqueous from the posterior to the anterior chamber. In early cases of iritis the slit-lamp will reveal some inflammatory cells in the anterior chamber, punctate precipitates of leucocytes on the posterior surface of the cornea ('k. p.'), oedema and vascular congestion of the iris stroma. The use of atropine in primary glaucoma spells disaster and the employment of eserine in iritis is not helpful.

Treatment

Acute glaucoma.—An acute attack of glaucoma must be regarded as a surgical emergency of a very serious character requiring prompt measures to reduce the intra-ocular pressure. Miosis is aimed at by the instillation of eserine drops, 0.5 or 1 per cent, at five-minute intervals for half an hour and then half-hourly until the intra-ocular pressure approaches the normal or operative treatment is imminent. Eserine should also be instilled into the other eye twice daily, for it is probable that early chronic glaucoma may be present and not yet have been detected. The patient is put to bed, and morphine may be necessary in many cases on account of the severe pain; it may also assist on account of its miotic effect. Heat in the form of continual hot bathings, an electrically-heated eye-pad or the application of medical diathermy is of value. The technique of the medical diathermy is briefly as follows:—The small active electrode is circular and is covered with several layers of cotton-wool wrung out in saline, applied evenly to the closed lids and held in place by a rubber head-band, which must be thoroughly dried before use. The different electrode, also covered by a similar pad, is applied to the forearm. Then the current is switched on and strength in the secondary circuit gradually increased until a comfortable sensation of warmth is experienced by the patient; this varies between 300 and 600 milliamperes. The duration of treatment is five minutes. Before the electrodes are disconnected the meter is brought back to zero and the main current switched off. Several such applications of medical diathermy will reduce the intra-ocular pressure from about 70 to 40 mm. Hg. in many cases. Two or three leeches applied to the temporal region on the affected side play a time-honoured part in the immediate treatment of acute glaucoma.

The intravenous injection of hypertonic saline solution has proved to be effective in reducing the intra-ocular pressure for a number of hours and thereby enabling the surgeon to operate under more favourable conditions. 50 c.cm. of 30 per cent. saline can be used alone or combined with gum arabic to raise the colloid content of the blood and to increase its osmotic pressure. The injection must be given slowly with the patient in the recumbent position. Complications in the nature of giddiness, collapse, and a fall of blood pressure have occurred when the injection has been made too rapidly. This method of treatment is contra-indicated in patients suffering from nephritis, a low blood-pressure, and a feeble constitution. After the injection intense thirst is felt, but it is necessary to limit the intake of water by the mouth. The oral or rectal administration of salines is uncertain in its effects.

If after one or two hours the intra-ocular pressure is not considerably reduced and the pupil not fully contracted an iridectomy should be performed as soon as possible. A general anæsthetic is often necessary, but in some cases the operation can be performed after careful infiltration of Tenon's capsule with novocaine and adrenaline. If the intra-ocular pressure falls to normal and there is satisfactory miosis an iridectomy is still indicated as the patient is liable to a recurrence. It is a more satisfactory operation after an acute attack of congestive glaucoma than trephining or other procedures which have as their object the formation of a filtering cicatrix.

Chronic glaucoma.—In the early stages of the disease and before there is an enlargement of the blind spot or nasal field defect, treatment by the miotics, eserine (0.25-5 per cent) or pilocarpine (0.5 per cent), instilled twice daily, may be given a trial and the patient kept under careful supervision. Pilocarpine is less irritating than eserine, but probably slightly less effective. It is a useful alternative in cases in which eserine irritation occurs. Massage of the globe in the morning and evening is helpful in promoting the drainage of the intra-ocular fluids, and anything productive of cerebral congestion should be avoided. Records of the intra-ocular tension and the visual fields should be made at frequent intervals, the former are better recorded in the morning as soon after rising as possible. The patient should be warned of the danger signals associated with a rise of intra-ocular pressure and of the importance of seeking immediate medical attention, also of the bilateral nature of the disease. Failure to keep the intra-ocular tension within physiological limits by miotics is an indication for operative treatment. To wait for visual field loss, cupping of the optic discs, and other classical signs of the later stages of the disease is to invite disaster.

There is no entirely satisfactory operation for the relief of chronic glaucoma. Many procedures have been devised to effect a filtering scar for the drainage of the intra-ocular fluid from the filtration angle through the corneo-sclera or the sclera and into the sub-conjunctival tissues, where absorption takes place. Of these, Elliot's corneo-scleral trephine with peripheral iridectomy is the best in the majority of cases. Lagrange's sclerotomy, Herbert's trap-door sclerotomy, and cyclodialysis are indicated in some instances. Iridectomy in chronic glaucoma without attempting to make a filtering scar is unsatisfactory, as the iris in the vicinity of its root has already become firmly adherent to the back of the cornea, where it obstructs the filtration angle and at operation tears away at the anterior limit of this zone of adhesions and so fails to open the filtration angle. The types of scar produced in the corneo-sclera after trephining are variable as regards their size, appearance and efficacy in filtering. Some become dense and ineffective after several months and the operation has to be repeated if the intra-ocular tension rises. Others are thin and ectatic and occasionally suffer late infection. About 50 per cent remain satisfactory for five years. The extended use of the gonioscope in practice may afford the ophthalmic surgeon additional help in deciding the type of operation indicated. After operation it is still necessary for the patient to present himself for periodic examination at monthly or two monthly intervals. In the late stages of glaucoma the eye becomes blind and painful. Excision of the globe is necessary in most cases, and, indeed, is justified as a few contain an unsuspected sarcoma of the uveal tract which, in the later stages of glaucoma, has not been recognized on account of opacities in the lens and media. If excision is refused, some relief from pain may be obtained by injecting 1 c.cm. of 2 per cent novocaine, followed five minutes later by 2 c.cm. of 80 per cent alcohol far back into the orbit, the puncture being made at a site between the lower border of the

external rectus and the outer border of the inferior rectus.

Secondary glaucoma.—The treatment of secondary glaucoma is that of the underlying ocular condition. In iridocyclitis atropine, heat, salicylates; and the treatment of focal sepsis are important. The presence of soft lens matter or blood clot in the anterior chamber may necessitate a paracentesis and wash-out of the anterior chamber after the intra-ocular pressure has been reduced by medical treatment. Dislocation of the lens into the anterior chamber associated with glaucoma requires extraction. For iris bombé iridotomy or iridectomy is necessary. When a malignant intra-ocular neoplasm is detected the eye should be excised. The treatment of secondary glaucoma often presents many difficult problems. The main therapeutic principle is to reduce the intra-ocular pressure by medical means and to be wary of surgical measures in inflammatory cases. If such become necessary, to interfere as little as possible in achieving the effect aimed at by the operation.

Infantile glaucoma (buphthalmos).—A condition of raised intra-ocular pressure occurs in infants owing to congenital defects in the formation of the filtration angle, such as a failure of the line of cleavage between the iris root and the periphery of the cornea, absence or malformation of the canal of Schlemm, intra-uterine infections resulting in anterior uveitis and peripheral synechiæ occluding the filtration angle. The ocular tunics are relatively soft and elastic in infancy and become stretched considerably by the raised intra-ocular pressure. The cornea is larger than normal, has a wide base, is prominent, thicker in the centre than at the periphery, and may show grey lines on its posterior surface from ruptures in Descemet's membrane. The sclera is thin and stretched, and all the dimensions of the globe increased. The anterior chamber is deeper than normal and the filtration angle occluded by the adhesion of the iris root to the periphery of the cornea. The canal of Schlemm may be small, narrowed, malformed or absent. The iris is flattened and atrophic. The lens is displaced backwards and much flatter than normal. The optic disc is cupped, the uveal tract, retina and optic nerve show atrophic changes characteristic of glaucoma. This condition is progressive, and treatment by miotics is useless. Surgical procedures, such as trephining, Herbert's sclerotomy, iridectomy, and other manœuvres are disappointing in their results. Both eyes are often affected, but sometimes one only.

Conclusion

The onset of glaucoma is in most cases insidious and must be searched for carefully in any person over 40 years of age complaining of neuralgic headaches. Sometimes the symptoms are very slight and appear negligible to the patient. Failure to recognize it and to establish early treatment leads to disastrous consequences. The most important sign before all others is the raised intra-ocular pressure, which is detected only by careful observations made on a patient suspected of glaucoma in the morning and evening, or at such times as symptoms are experienced. The disease is generally bilateral, and it is imperative to keep the patient under observation for the remainder of his life. The results of surgical treatment are on the whole satisfactory in 60 to 70 per cent of cases, although the prognosis will depend much upon the stage at which the disease is effectively treated and other factors peculiar to the individual case. Much patience, tact and fortitude are needed by the medical practitioner in piloting the patient through all the changing phases of his mental reactions to the disease, beginning with his initial amused indifference to the situation and ending in some instances with his pathetic terror as realities begin to cast their dark shadows over him.

Diet and Endocrine Deficiency

By H. GARDINER-HILL, M.D., F.R.C.P.

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A VERY brief review of the metabolic functions of the endocrine glands will convince the most sceptical that dietetic problems are intimately associated with endocrine defects. There is, for instance, the well-known effect of the thyroid on the basal metabolic rate, and the important part played by iodine in the genesis of simple goitre. The secretion of the parathyroids is intimately connected with calcium metabolism, particularly as regards its deposition and mobilization from bone. Of the pituitary hormones and their metabolic functions less is known, though pituitrin from the pars intermedia, probably secreted through the posterior lobe, has well-known effects on water and sugar metabolism. Pituitary hormones also have suspected relationships with fat metabolism, though the evidence is far from convincing. There is some reason to suppose that one of them is connected with the distribution of circulating fat. Recently some animal experiments have been described, in which an extract of the anterior lobe appeared to play a significant part in the production of ketosis. Next there is insulin, the hormone of the islet tissue of the pancreas, and its well-known effect on carbohydrate metabolism. In discussing the metabolic functions of the suprarenals, and particularly the cortical hormone, we are on less sure ground. Cortin is known to be an important factor in maintaining the efficiency of the muscular system. Clinically, this is well illustrated by the severe asthenia of Addison's disease, in which it is deficient. Experimentally it is known that injections of the cortical extract produce a marked increase in the power of doing work in normal subjects, both human and animal. Some authorities have suggested that the adrenal cortex is concerned with fat metabolism. It appears to be a storage depot for lipoids. Then, it is to be remembered that clinical observations have repeatedly emphasized the frequent occurrence of obesity in, what has been termed, the adreno-genital syndrome. The effect of the sex glands on metabolism is also little understood, but it is a well-known fact that metabolic disturbance follows castration. This review will give an indication of the lines on which a clinical discussion of the relationship between diet and endocrine deficiency should proceed.

Simple goitre, iodine and dietetic deficiency

In the field of thyroid disease a close relationship between diet and endocrine deficiency is found in studying the ætiology of simple goitres. These may be of three main types—the diffuse colloid, a simple hypertrophy; the nodular adeno-parenchymatous, in which hyperplasia is predominant; and, thirdly, the lymphadenoid goitre of myxœdema.

We will take the first two types for consideration. Probably the nodular adeno-parenchymatous gland is a later stage of the diffuse colloid, in which attempts at compensation have failed. Thyroid deficiency may be found with either in the later stages, though far more commonly with the nodular than with the diffuse. The evidence associating lack of iodine in the diet with the prevalence of these goitres is most suggestive, though there is every reason to suppose that they may also result from other causes. Simple goitre is rare in communities where the diet contains a sufficiency of iodine. There is much evidence, on the other hand, to relate the prevalence of goitre in endemic areas with deficiency of iodine in soil or water. The well-known results of iodine prophylaxis in endemic areas in America, Switzerland and New Zealand provide additional proof that iodine must be an important factor in the prevention of goitre,

and its end-results—thyroid deficiency. Some recent work suggests that the presence of iodine protects, rather than that lack of iodine is the cause of such goitres. It seems to be immaterial which view is accepted, if the importance of iodine as a factor is admitted. In endemic areas, prophylactic treatment consists of the addition of iodine, or iodides, to the diet. In ordinary communities, sufficient iodine is present in the diet for the maintenance of normal thyroid function. A mixed diet containing an abundance of fish, fruit and vegetable should ensure adequate supplies of iodine.

A third type of simple goitre, to which attention has been drawn, is the lymphadenoid goitre of Williamson and Pearce. It is chiefly of interest as the gland found in association with myxœdema, and for the fact that McCarrison has been able to produce it experimentally in rats, by feeding them on a diet deficient in vitamin A. All the symptoms of fully-developed myxœdema can be controlled by thyroid extract, and dietetic measures are not usually necessary. If, however, a considerable degree of obesity has developed before the diagnosis of myxœdema has been made, and treatment with thyroid extract instituted, dietetic restriction, such as is recommended subsequently in the section dealing with obesity and given in conjunction with thyroid extract, will be found to produce more satisfactory results.

Tetany, hypoparathyroidism and calcium deficiency

In the field of parathyroid disease there is also a close relationship between dietetic problems and endocrine deficiency. A study of tetany shows that it may be associated with a number of different conditions—hypoparathyroidism, rickets, over-ventilation of the lungs, gastro-intestinal disturbance, vomiting with loss of hydrochloric acid, and diarrhoea. It is only with the first two pathological states that we are here concerned, and in both the characteristic feature is a depression of the level of the blood calcium, such as is not found in the other groups. Hypoparathyroid tetany is usually seen clinically after surgical operations on the thyroid, though it is a rare complication. Idiopathic hypoparathyroidism is also known to occur. In some types of rickets depending on a vitamin D deficiency, tetany may be found with low serum calcium, similar to that following parathyroidectomy.

What then are the respective rôles of the parathyroids and vitamin D in these disturbances of calcium metabolism? Bone deposition and denudation seem to depend on the presence of the parathyroid hormone, its principal action being to mobilize calcium stores from the bones. Vitamin D, calciferol, on the other hand, seems to be more concerned with the absorption of calcium through the intestinal wall. In the vitamin D deficiency of some forms of rickets, the result of lack of exposure to the sun of either the diet or the individual, with blood calcium low, and characteristic changes in the bones, vitamin D administration restores the blood calcium to normal. So far as present evidence goes, it seems that the level of the serum calcium is maintained by these factors, controlling in the one case the absorption of calcium from the gut, and in the other the degree of bone deposition and denudation.

These data emphasize the important part played by parathormone, vitamin D, and supplies of calcium in the diet, in the treatment of clinical tetany with low serum calcium. Fortunately, tetany of this type is rare. The condition of post-operative hypoparathyroidism provides an example of the different forms of treatment required. In the acute post-operative condition, a high calcium intake is the most important consideration. In mild and chronic cases regular daily calcium supplies, with cod-liver oil or calciferol, should keep the individual free from symptoms. In more severe cases, however, and especially those in which parathyroidectomy has been complete, or almost

complete, the usual rules applying to endocrine deficiency diseases must be observed. Regular and continuous treatment with the deficient hormone must be carried out. It will probably suffice to administer to such patients parathormone, in doses of five to ten units daily, with high calcium diet and vitamin D.

Disturbances of carbohydrate metabolism and endocrine deficiency

Two clinical syndromes, diabetes and glycosuria, have to be considered under this heading. The former is a true endocrine deficiency, the result of under-functioning of the islet tissue of the pancreas, to which the term hypo-insulinism can be applied. The precise action of insulin is not completely understood, but we know that, following its administration, the blood sugar is lowered apparently the result of a withdrawal of glucose by the tissues. Insulin appears to control the storage of muscle glycogen, and probably also of liver glycogen. The most striking feature of the diabetic is the loss of power on the part of the tissues to utilize glucose. This is shown by hyperglycemia and glycosuria. When the amount of carbohydrate utilized falls below a certain level fat katabolism is also affected, fatty acids are imperfectly oxidized, and ketosis develops. These changes can be corrected by the administration of insulin. Moreover, if coma from ketosis has supervened, sufficient glucose given with insulin will restore normal fat metabolism. The modern treatment of diabetes with insulin is a great therapeutic advance and the insulin-treated diabetic, in whose case appropriate adjustments of diet have been made, compares favourably with a normal individual. The main problem is to provide adequate supplies of carbohydrate, and to ensure its utilization. In the past, it was the custom in treating diabetics to restrict severely the intake of carbohydrate, whilst the limit of fat was fixed by the necessity of avoiding ketosis. Within the last few years, however, this practice has changed, and there is now a tendency to swing over to a more normal carbohydrate intake adequately covered by insulin.

Glycosuria, without symptoms of diabetes, is found in other endocrine syndromes, though it is doubtful if in these conditions it is attributable to a true endocrine deficiency. An example is the glycosuria found with pituitary lesions, such as the basophile adenoma of Cushing. It also occurs in the adreno-genital syndrome, with changes in the adrenal cortex. In the early stages of both conditions the individual tends to become obese, whilst later on glycosuria develops. These are the fat, bearded diabetics of Achard and Thiers. Even when glycosuria develops, however, weight is not lost, and ketosis remains absent, in spite of carbohydrate starvation. It would appear that the storage mechanism for carbohydrate is defective without the usual symptoms resulting from decreased output of insulin. Perhaps there is an increased output of some antagonistic principle from the pituitary or adrenal, which counteracts the action of insulin. At any rate, pituitrin and adrenalin will overcome the effects of insulin hypoglycemia. The treatment of obesity and glycosurias of these types is largely a dietetic problem.

Cachexia and endocrine deficiency

Under the heading of endocrine, or endogenous, cachexia are usually included a group of not very rare conditions, of the underlying pathology of which little is known. They are characterized by extreme emaciation, loss of appetite, severe constipation and gastro-intestinal hypofunction, which can be demonstrated radiologically, endocrine features, such as amenorrhœa and often hypertrichosis, cardiovascular asthenia with hypotension, slow pulse and a peculiarly sluggish circulation, with cyanosis of the extremities. Possibly the group includes several different syndromes. Anorexia nervosa of psychological origin

must be differentiated. In the typical case of endogenous cachexia the picture of endocrine disturbance predominates. Simmonds has described one type, the result of anterior lobe pituitary deficiency from infarction. These individuals are wizened in appearance, wasted, and the sex functions are in abeyance. Another type, with hypertrichosis and vascular asthenia, has been attributed to deficiency of the adrenal cortex, and appears to be the reverse of the adreno-genital fat syndrome already referred to. The adrenal pathology, however, of this condition has not been worked out. Though the background in these cases is one of endocrine disturbance, they all without exception show a remarkably sub-normal food intake, and attempts to correct this are generally the most difficult problem of their treatment. Replacement therapy with prolactin has been reported favourably upon, in the pituitary type. Insulin therapy *plus* glucose, however, is probably the most hopeful line of treatment in the others. Cortin is under trial.

Obesity and endocrine deficiency

Dietetic problems and endocrine deficiency are closely related in obesity. Endocrine obesity may occur as the result of thyroid deficiency, with structural lesion of the pituitary, such as the adenomata of all types, and in Fröhlich's syndrome due to a craniopharyngeal pouch cyst, in the adreno-genital syndrome and in deficiencies of the sex glands, especially those resulting from their surgical removal. Thyroid obesity appears to result directly from a deficiency of the active principle of the thyroid secretion, and the resulting lowering of the basal metabolic rate. Both the obesity and the basal metabolism can be corrected by the administration of an amount of thyroid extract equivalent to that which is deficient. The sex gland obesities may also result from a true deficiency of secretion, though there is seldom any alteration in the basal metabolism in these cases. The relationship of the pituitary to obesity is by no means clear. It is usually considered to be a result of deficiency of the secretion of the posterior lobe and intermedia, but the administration of pituitrin seldom produces any striking change in the clinical condition of the patient. In the adreno-genital syndrome it seems extremely doubtful if the obesity is due to a deficiency of secretion at all. The clinical and metabolic features rather suggest some hyperactivity of a storage mechanism, which, in the later stages of the disease, tends to become defective.

It must be briefly mentioned that endocrine obesity, with gross structural lesions such as these, is relatively rare, compared to the large number of obese patients who exhibit similar endocrine stigmas. In the majority of the latter, there is a family history, not only of obesity of the same type, but also of the same endocrine stigmas. The most likely explanation seems to be that these individuals have inherited some functional endocrine disturbance of a minor but similar type to that seen in the organic syndromes.

Though our present knowledge of the underlying metabolic disturbance in endocrine obesity is so incomplete, a practical experience of any of these various conditions will show the very important part played by food intake, both in their development and treatment. If the principle be accepted that the body weight cannot be maintained without ingestion of food or water, and there seems no reason to doubt it, a lowering of the intake will result in loss of weight, even in endocrine obesity. In endocrine cases, however, this treatment should not be employed without replacement therapy of the deficient hormone, or deterioration in health ensues. If, for instance, in the obesity of hypothyroidism, with its low basal metabolic rate, the diet of the individual is lowered, the basal metabolism will be lowered further, with exaggeration of the hypothyroid symptoms. These, however, and the obesity can be corrected by dietetic measures, given in conjunction with thyroid extract.

Various dietetic schemes have been introduced for the treatment of obesity, simple and endocrine, the essential feature of the majority being that they are sub-caloric. It is important to remember that the intake of a working individual cannot be lowered below a certain level, with the maintenance of good health. If, therefore, a rapid loss of weight is desired, such as can only be obtained by severe restriction of diet, then it is advisable to carry out such initial treatment in bed. In fact, the principle of losing weight rapidly in bed, when in endocrine cases replacement therapy can also be accurately controlled, and then of maintaining a stationary weight, by regulation of diet and dosage accordingly, when the patient gets up and about again afterwards, will probably give the best results in the treatment of these conditions.

Summary

To summarize this article, it is apparent that a close relationship exists between dietetic problems and endocrine deficiency. This is well illustrated by observations on iodine in simple goitre, and vitamin A deficiency in lymphadenoid goitre. Calcium supplies, vitamin D, and parathormone are intimately associated in the metabolism of calcium, while insulin is the controlling factor in carbohydrate metabolism. In some instances, obesity and cachexia are due to endocrine deficiency, though the part played by diet in these conditions is at least equally important. As regards general principles of treatment of the series of conditions under consideration, the essentials seem to be replacement of the defective glandular secretion, with reorganization of the metabolic disturbance by appropriate dietetic measures.

The Inheritance of Diabetes

By PRISCILLA WHITE, M.D.

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and

GREGORY PINCUS, D.Sc.

(From the *Journal of the American Medical Association*, Vol. CIII, 14th July, 1934, p. 105)

Is it possible to predict the onset of diabetes in a given individual at a given time? This question was uppermost in our minds, 17th December, 1931, for while we were treating a 5-year-old girl for diabetic coma her solicitous similar twin sister waited nearby. Surely, we thought, if the theory of the inheritance of diabetes is correct here is an instance in which the prediction is possible. Our patient had just developed diabetes and the second twin should develop the disease and likely within a decade. 10th April, 1934, the first child returned to the clinic with her twin sister. Three weeks previous to this the second twin had developed the symptoms of diabetes and her mother had found a red reduction with the Benedict test. At the clinic the diagnosis was confirmed, for the urine was found to contain 4.6 per cent of sugar and the blood 0.28 per cent.

The conception of the inheritance of diabetes is not new, for it was first described by Morton in 1696 and has been emphasized by many students of the disease. Inconsistencies in the series of reports are bound to arise, first, because of the short duration of the life of diabetic patients prior to the use of insulin, so that the data of family histories have been incomplete and the mode of transmission has not been demonstrable, and, second, because some schools believe in the manifold origin and character of the disease and others in its unity. The former may thus select for analysis only those patients who have a positive history of inheritance, and the latter will analyse consecutive case histories. We ourselves believe in the unity of the disease—unity of symptoms, manifestations, complications and the underlying cause.

On this conception of the unity of diabetes our own analyses have been made.

The evidence of the inheritance of diabetes rests primarily on three facts: (1) the concurrence of diabetes in homologous twins, (2) the greater incidence of diabetes in the relatives of a diabetic person than in a control population, and (3), indirectly, on the demonstration that mendelian ratios are found in large series of case histories selected at random and in smaller series of families tested for accuracy of diagnosis and for latency of the disease.

The concurrence of diabetes in twins has already been described in the literature. This has obviously suggested the inheritance of the disease, since in 80 per cent of the cases reported the twins were of the homologous type. No analysis of dissimilar twins has been made, but from such a comparative analysis much can be learned, for, if the disease is inherited, the incidence of diabetes in both similar twins should obviously exceed the incidence in dissimilar twins. The latter, in fact, all conditions being equal, should show the same inheritance as that found among ordinary brothers and sisters.

An analysis of our own data shows that forty-one of our diabetic patients have a twin. Of this group thirteen pairs were known to be similar and thirteen dissimilar. We were compelled to exclude fifteen sets of twins because of the death of one of the twins in infancy. Among nine of the thirteen sets of similar twins both were diabetic, whereas in only two of the thirteen pairs of dissimilar twins were both diabetic. The incidence among the siblings of control, diabetic and twins populations is compared in table II.

It is evident that an overwhelming excess occurred among the group of similar twins.

The age incidence of diabetes must be considered here, for perhaps the excess in the similar twin group could be explained on the basis of greater age. This is not the case, for although 45 per cent of the individuals in the similar twin group were in the age incidence zone of 50 years, 35 per cent of the dissimilar twins were of the same age, and the median age of the two groups was in the same decade. The family history of diabetes in the two groups of twins was nearly identical, since there were three instances of parental diabetes among the dissimilar twins and two among the similar twins.

The statistically significant difference between the occurrence of diabetes in a diabetic and a control population was that 2 per cent of the parents of our control population had diabetes whereas 8 per cent of the parents of our diabetic patients had the disease. Diabetes occurred ten times more frequently in the brothers and sisters of diabetic patients than in the control group. Criticism of such data is often given that perhaps we selected unfairly against diabetes. This is not actually the case and is substantiated by the control series of German and English investigators.

Expected mendelian ratios of the simple recessive type were found in our three types of crosses (diabetic \times diabetic, diabetic \times carrier, carrier \times carrier). Among 800 odd consecutive families studied, ninety-eight diabetic patients (or 4 per cent) were found in the 2,309 siblings of the carrier \times carrier cross; forty-eight (or 10 per cent) in the 475 siblings of the diabetic \times carrier cross, and eight diabetic children (24 per cent) in the thirty-three instances of the diabetic \times diabetic cross. If our data had been complete we would have expected more—16 per cent in the first, 40 per cent in the second and 100 per cent in the third—but this could occur only if all members of the families had attained old age. The significant fact is this: The expected ratios were 1 to 2.5 to 6.1, and the actual ratios were 1 to 2.4 to 5.7.

It is on this point and the concurrence of diabetes in homologous twins that the validity both of the initial hypothesis of inheritance and of the mendelian type of transmission rests, for if the basic aetiology

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of diabetes were due to an infection, trauma or nutritional state it is highly improbable that such an excess would occur in homologous twins and less than one chance in a million that the three ratios would be fulfilled in this manner. Actually we have identified only one-fourth of the diabetic patients expected, and the next step has been the attempt to find the missing patients. There are two sources. Some may have occurred in those individuals who died of other causes before developing diabetes and some will be

TABLE I

Diabetes mellitus in similar and dissimilar sets of twins

Similar twins				
Set	Sex	Diabetes mellitus	Age of onset	Family history
1	.. ♀ ♀	++	5-8	Father's mother
2	.. ♀ ♀	++	13-3	Father's brother
3	.. ♀ ♀	++	29-17	None
4	.. ♀ ♀	+ 0	30	Mother's aunt
5	.. ♀ ♀	++	52-47	Two sisters, mother
6	.. ♀ ♀	++	62-62	Brother
7	.. ♀ ♀	+ 0	63	None
8	.. ♀ ♀	++	67-29	None
9	.. ♀ ♀	++	67-19	None
10	.. ♀ ♀	+ 0	73	Mother
11	.. ♀ ♀	++	55-53	None
12	.. ♀ ♀	+ 0	60	None
13	.. ♀ ♀	++	63-56	Brother
Dissimilar twins				
1	.. ♂ ♂	+ ..	19-12	Cousin
2	.. ♀ ♀	+ 0	14	None
3	.. ♀ ♀	+ 0	19	None
4	.. ♀ ♀	+ 0	25	None
5	.. ♀ ♀	+ 0	42	Mother
6	.. ♀ ♀	+ 0	48	Mother
7	.. ♀ ♀	+ 0	52	Father
8	.. ♀ ♀	+ 0	54	Mother's brother
9	.. ♀ ♀	+ 0	59	None
10	.. ♀ ♀	+ 0	56	None
11	.. ♀ ♀	+ 0	62	None
12	.. ♂ ♂	+ 0	60	None
13	.. ♂ ♂	++	62-62	None

found among people who have not reached the diabetic danger zone of middle life. The remainder of the problem depends on the time or age behaviour of the disease and the non-diabetic lethal factors. The validity of time behaviour or age incidence of diabetes is undoubted, for in each consecutive thousand of our cases, our cases compared with those of other clinics, and in American clinics as compared with European clinics the incidence behaviour is essentially the same. From these two factors the potentiality for developing diabetes in parents and children has been predicted.

Although these data seem obviously convincing, besides dealing with a population whose status is changing—once diabetic always diabetic, but once non-diabetic not always non-diabetic—another source of confusion is possible. Dependent on case histories,

TABLE II

Incidence of diabetes in a control, diabetic and twins population

Type of population	Number of individuals	Per cent of siblings with diabetes
Control	.. 153	0.6
Diabetic	.. 523	6.0
Dissimilar twins	.. 13	16.0
Similar twins	.. 13	70.0

some individuals classified as diabetic may be non-diabetic and some classified as non-diabetic may actually be diabetic. Therefore, a series of control and another of diabetic families were studied for symptoms and tested with routine blood sugar tests and with tolerance tests.

Relative hyperglycæmia was characteristic of the families of diabetic individuals, no matter whether the examinations were routine or by tolerance test: 14 per cent in the 169 persons tested by routine and 25 per cent in the 95 persons examined by tolerance test were diabetic in type, as compared with 2 per cent in the control population. These cases were not classified as diabetic and not utilized in our calculations, because we have dealt only with clinical cases of diabetes and not with potential diabetes. Time alone will reveal the significance of the latter observations. The tested selected families on the basis of clinical diabetes confirmed the consecutive case histories.

CONCLUSIONS

1. Each member of similar twins developed diabetes more than four times as frequently as each member of dissimilar twins; namely, 70 per cent of the former and 16 per cent of the latter.

2. The incidence of diabetes in the relatives of a diabetic population is significantly greater than in a non-diabetic group.

3. Mendelian ratios were found in a consecutive series of diabetic cases and in a selected mendelian population tested by histories and blood sugars.

4. Many blood relatives of diabetic patients have symptomless hyperglycæmia the significance of which is unknown. These instances occurred when one would expect diabetes to develop according to mendelian inheritance.

5. We believe that the potentiality for developing diabetes is transmitted as a simple mendelian recessive trait and that the secondary factors which permit the expression of the gene can best be studied among predestined diabetic patients; namely, homologous twins of diabetic patients and the offspring of two diabetic patients.

Reviews

OPERATIVE GYNÆCOLOGY.—By Dr. H. V. Penham and Dr. J. Amreich. Authorized translation made by L. K. Ferguson, M.D. Volumes I and II. 1934. J. B. Lippincott Company, Philadelphia and London. Pp. xxvi plus 245 in volume I and viii plus 246 to 779 in volume II. Largely illustrated, mostly in colour. [Obtainable from Messrs. Butterworth and Company (India), Limited, Calcutta.] Price, Rs. 78-12 for complete volumes

It seems quite impossible to avoid the word monumental in reviewing this work, mainly because of the magnificent lines on which it has been conceived and executed, but also because it is no mere record of a passing phase, but is likely to remain as a permanent contribution to the science of gynecological surgery for many generations, and because of the associations of the word, reminding us that the senior author did not live to see his work completed.

The first volume constitutes an introduction to the subject and deals with such matters as the anatomical relationship of the various structures in the pelvis, pre- and post-operative complications and their treatment, antisepsis and asepsis, anaesthesia, and preliminary surgical procedures, such as opening the abdomen. The second volume describes actual surgical operations. Despite the size of the book, strict selection has had to be exercised in the choice of the procedures described, because of the minute details of technique into which the authors have entered. The treatment of cancer of the cervix by radical abdominal and vaginal hysterectomy constitutes the central feature of the book, but the surgical treatment of many other conditions is discussed and described.

The book is not in any sense a textbook of gynaecological surgery for the student or general practitioner, but it is a handbook (in the German sense of the word) for the young surgeon, especially—but not only—the gynaecological surgeon. No book is capable of turning a raw student into an efficient surgeon, but if any book could effect this change, this would be the book; the illustrations are so detailed, yet so realistic, that whilst turning the pages one finds oneself transported to dissecting room or operating theatre, as the case may be. In the written descriptions of the different procedures no detail is too obvious or too unimportant to escape minute treatment. In surgical books the opening of the abdomen is often dismissed in a few words or lines, but not so in this book; it is described on 31 (large quarto) pages with 37 illustrations.

The young English-speaking surgeon may consider himself very fortunate that this book is available in his language, and if he cannot afford a trip to Vienna, he will find that by purchasing and reading this book he will gain many of the advantages of such a trip at a much smaller expenditure of time and money. For this, much credit is due to the publishers, the authors, the translator and by no means least to the artist, Karl Hajek, for his beautiful illustrations.

SYNOPSIS OF PHYSIOLOGY. Third Edition.—By N. J. Vazifdar, L.M. & S., F.C.P.S., Captain, A.I.R.O. 1934. Ideal Books Company (Medical Publishers), Bombay. Pp. 617, with 96 illustrations. Price, Rs. 7-8

PHYSIOLOGY OF THE CENTRAL NERVOUS SYSTEM AND SPECIAL SENSES. Sixth Edition.—By N. J. Vazifdar, L.M. & S., F.C.P.S., Captain, A.I.R.O. 1934. Ideal Books Company (Medical Publishers), Bombay. Pp. 341, with 39 illustrations. Price, Rs. 5-8

THE volumes have been nicely got up and printed on good paper. The subject-matter has been carefully compiled and brought up to date, although a little more attention to histology is desirable. Nevertheless the books will be of great use to students in revising before examination. The tables are useful and will be found convenient for ready reference.

The volume on the *Central Nervous System and Special Senses* is the older of the two publications. It is already deservedly popular and needs no further commendation. This part of physiology is difficult to learn but Dr. Vazifdar has been able to alleviate this to some extent.

It is hoped these two volumes will be greatly appreciated by students.

P. D.

MODERN TREATMENT IN GENERAL PRACTICE.—Edited by Cecil P. G. Wakeley, D.Sc., F.R.C.S., F.R.S.E. 1934. Published by the Medical Press and Circular, London. Pp. viii plus 426. Illustrated. Available from Messrs. Baillière, Tindall and Cox, London. Price, 10s. 6d. [Messrs. Butterworth and Company (India), Limited, Calcutta, have the exclusive right of selling in India, Burma, Ceylon, Federated Malay States and Straits Settlements]

TREATMENT to-day is much more than merely writing a prescription; the developments in different branches of medical science have led to the recognition of other fields in therapeutics. In order, therefore, to cover the subject of treatment, it is not sufficient merely to review the action of drugs; the disease must be studied, its causation, its symptoms, its prognosis and its complications, all assist in determining the treatment.

The editor is to be congratulated for bringing out in a handy volume all the latest information and discussions on treatment of the various diseases, both surgical and medical, commonly met with by the practitioner. The articles in this volume have

been written by specialists. Etiology and symptoms are briefly discussed and only so far as they affect treatment. Indeed, the book is in all respects what its editor claims for it—a book written for the general practitioner and designed and intended to set forth concisely and lucidly the latest progress made in medicine and surgery.

The book is very well arranged and the discreet employment of the headings in heavy type makes reference very easy. It is written in a style at once readable and convincing and fills a distinct place in the literature on treatment and ought to find a place in the library of every medical practitioner in this country.

R. N. C.

STUDIES IN BLOOD FORMATION.—By T. D. Power, M.D., M.R.C.P., D.P.H., D.P.M. 1934. J. and A. Churchill, Limited, London. Pp. vii plus 124. Illustrated. Price, 8s. 6d.

IN the introduction the author apologizes for the nature and variety of his investigations; surely no such apology is necessary (here, at least), but we are not at all sure that some apology for their publication in book form is not due. In our opinion it would have been far better to have published the results of his investigations in some appropriate scientific journal. As the author admits, these are various and incomplete. In places the data are far too slender to base heterodox conclusion upon, and in others the experiments reported suggest the exercises of a student.

Malaria therapy, sulfofin, thyroxine and the inevitable Indian ink (spelt in at least three different ways) have been used as stimuli to produce the changes that he studies. The Indian ink bottle appears to exert an irresistible attraction on the embryo hæmatologist, but the results obtained with this medium are usually more spectacular than helpful.

Nevertheless, the book will be read with considerable interest by hæmatologists. Even if they do not agree with his conclusions, they will undoubtedly find many of the author's ideas stimulating, and to readers of this class we can recommend the book.

L. E. N.

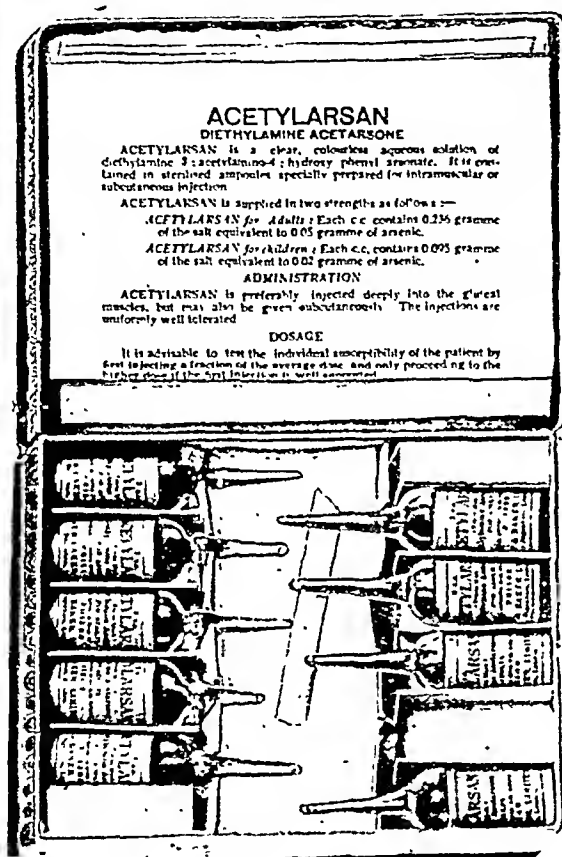
PRACTICAL METHODS IN BIOCHEMISTRY.—By Frederick C. Koch. 1934. Baillière, Tindall and Cox, London. Pp. viii plus 280, with 17 figures. Price, 10s.

TO write a practical book on laboratory methods is not difficult, it is quite otherwise however with a good one. Originality in such a book is not easy to attain, usefulness to the practical worker is rather the ideal to aim at. The outstanding merit of this book is the detailed description of the chemical basis of the qualitative tests. So often such tests are described empirically. The pages on the reactions of carbohydrates in an alkaline medium and their reducing properties are particularly instructive and the introduction of graphical formula makes the text much easier. Another valuable addition to the book is the appendix. Apart from a number of receipts for making standard reagents there is (to mention one item only) a detailed description of the chemistry of oxidation by permanganate—a reagent used by so many and understood by so few, particularly in clinical medicine. The chapter on the blood pigments however falls short of the author's standard in the rest of the book. The recent work of Anson, Mirsky, Keilin *et al.* on the exact chemical relationship of the various hæmoglobin derivatives, *e.g.*, hæmo-chromogen and the hæms should have been given. There is also perhaps one excusable omission. A page or two or even a note on oxidation reduction systems might have been written as the subject is becoming of increasing importance on biochemical work. The

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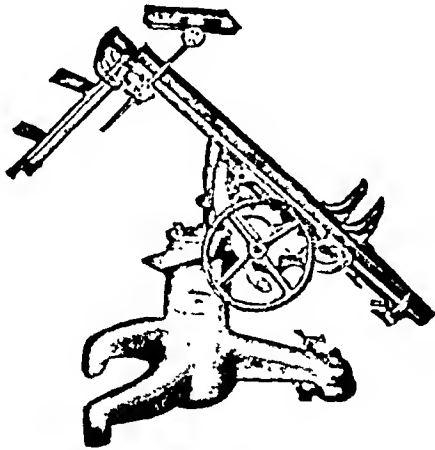
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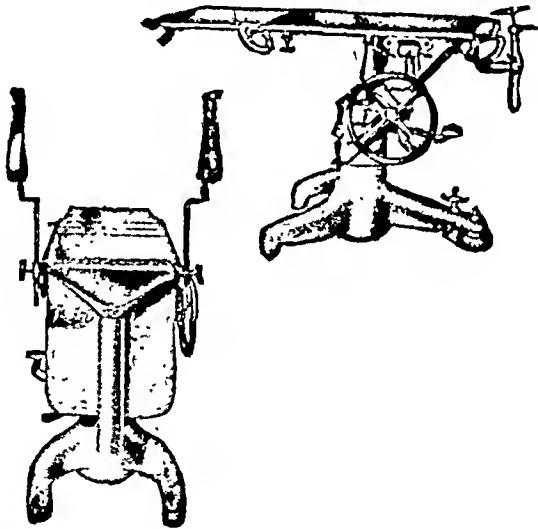
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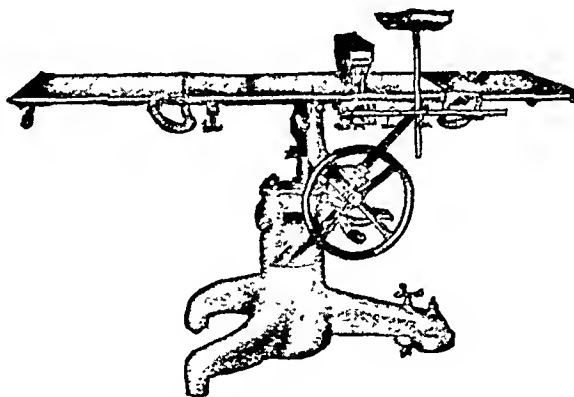
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mathematical theory is allied to that of pH measurement and the chemical basis of oxidation and reduction as an electron transfer (so well described in the appendix) could both be incorporated into a small chapter or annex to that on hydrogen ion concentration. In spite however of these criticisms the reviewer intends keeping this book at his right hand in the laboratory.

H. E. C. W.

VENEREAL DISEASES: ITS PREVENTION, SYMPTOMS AND TREATMENT. Fifth Edition.—By H. W. Bayley, M.C. 1934. Chapman and Hall Limited, London. Pp. xv plus 260. Illustrated. Price, 10s. 6d.

This is a little book, consisting of 260 pages, in which a very concise account of venereal diseases is given. It is divided into five sections. Section I deals with the preventive aspect of venereal disease. Section II deals with the diagnosis and treatment of syphilis. In keeping with the importance of the disease it is the largest section in the book and very well written. It contains a few paragraphs on the malaria treatment of neurosyphilis and the treatment of cardiovascular syphilis. Section III deals with the diagnosis and treatment of gonorrhoea in the adult as well as with ophthalmia neonatorum and vulvovaginitis of girls. Section IV deals with non-specific lesions such as soft sore, bubo, phagadema, warts, etc. There is scope for improvement and elaboration of this section. Section V deals chiefly with the organization of the consulting room, methods of examination of patients and of specimens obtained from them. On the whole the book may be considered a useful and up-to-date one, though concise. It contains several illustrations, some of which are good. It can be recommended to students and practitioners who are not specialists in the subject.

K. V. K.

THE TREATMENT OF SYPHILIS: FOR USE OF THE MEDICAL PROFESSION. Published by Messrs. May and Baker, Limited, London. Pp. 66. Illustrated

This is a small handbook on the treatment of syphilis which is written chiefly with a view to advertise some of the antisyphilitic remedies such as Novarsenobillon, Tryparsamide, Metarsenobillon and Stovarsol sodium, Acetylarsan, Bisglucol, Bistovol, Neocardyl, Rubyl and Ametox manufactured by May and Baker, London. It contains valuable information regarding the use of these drugs. Practitioners using these drugs may find the book helpful.

K. V. K.

EXTERNAL DISEASES OF THE EYE.—By D. T. Atkinson, M.D. 1934. Henry Kimpton, London. Pp. xviii plus 704, with 479 engravings. Price, 35s.

This book is devoted for the most part to diseases of the anterior segment of the eye which the author very rightly considers to be the most important part of ophthalmology as they are seen more often than other varieties of ocular diseases and can be diagnosed without the use of special and expensive apparatus.

The book comprises fifteen chapters devoted to the history of ophthalmology, diseases of the eyelids, the lachrymal apparatus, the orbit, the conjunctiva, cornea, sclera, iris and ciliary body. In addition there are chapters on glaucoma, diseases of the crystalline lens, diseases of the external muscles of the eye, the hygiene of the eyes, history taking and case records, and finally remedies used in the treatment of external diseases of the eye.

Owing to the close association of ophthalmic and intra-nasal diseases a small portion of the book is devoted to a short description of nasal pathology and the treatment of intra-nasal conditions involving the eye.

The book is profusely illustrated with photographs of actual cases from wax models and from drawings made by the author himself. Many of these are excellent but some are poor, too small, and fail to show what the author set himself out to demonstrate.

The subject-matter contains little that is new and that which cannot be obtained in ordinary textbooks, the chapter on fungus diseases being an exception is excellent. Many of the operations and operative technique described would not be accepted in India more especially those on cataract and glaucoma.

The book can hardly be described as a reference work for ophthalmologists, but will prove useful and interesting to students and the general practitioner.

E. O'G. K.

HEALTH-GIVING DISHES.—Compiled by B. Brupbacher-Bircher. Edward Arnold and Company, London. Pp. xvi plus 239. Price, 6s.

As is pointed out in the preface, during the last few years more and more attention has been directed towards dietary, both in health and in disease. It is not however emphasized that, though we have now fully appreciated the fact that a diet of beefsteak alone is not an ideal one, we are also beginning to realize that a pure vegetarian is usually a deficient one. The fact is, a 'balanced' vegetarian diet is a luxury that only the rich, or the exceptionally-placed, can afford to indulge in and still maintain maximal health. However, those who have a fancy for a vegetarian diet, and are prepared to spend the time and money on preparing the various dishes described therein, will find this book, which is nothing more or less than a receipt book, of value and interest.

POCKET MEDICAL DICTIONARY OF THE PRINCIPAL WORDS USED IN MEDICINE AND THE COLLATERAL SCIENCES.—By the late G. M. Gould, A.M., M.D. Tenth Edition. Revised by C. V. Brownlow. 1934. (Over 40,000 words). H. K. Lewis and Company, Limited, London. Price, 10s. 6d. (with thumb index, 12s. 6d.)

THERE can never be such a thing as a completely comprehensive medical dictionary, as, even if it were possible to collect together the information necessary, many new words would be added to the language whilst the book was being printed. Failing completeness, utility is the next quality to be aimed at.

Consisting of over a thousand pages, this dictionary contains 40,000 words, and it will go into an ordinary-sized pocket, though not into the breast pocket of the morning coat of the fashionable physician, without causing him acute mental distress.

This dictionary has now reached its tenth edition and sixty-fourth printing. It only needs to be said that 800,000 copies have been sold. Any words of praise that we could muster would be of little value in the face of these hard and eloquent facts.

Few changes have been made in this last edition; inevitably new words have been added and a few corrections made. Certain tables of arteries, bones, etc., which were previously in the body of the dictionary have now been collected at the end and are placed there in alphabetical order, and other tables have been added. This is a distinct improvement. It is a very complete little dictionary and most excellent value for the money.

SEX DIFFICULTIES OF THE MALE.—By K. M. Walker, F.R.C.S. 1934. Jonathan Cape, London. Pp. 264. Available from Messrs. Butterworth and Company (India), Limited, Calcutta. Price, Rs. 3-12

Old wine in a new bottle—under a new and in many ways more satisfactory title, Kenneth Walker has given us what is in effect a second edition of a successful book, *Male Disorders of Sex*. The change of title will ensure a wider public for this book, which before attracted mainly the medical profession;

anticipating this the author has met his non-medical readers half-way and has translated some of his technical into more popular language, and has here and there added explanations. Nevertheless, the book is written primarily for the medical man and student, and may therefore be considered as a serious contribution to the medical sex literature of the day; as such it is particularly welcome.

Not only has the author attempted, but he has achieved, a book that can be read profitably, and with pleasure, by both the medical man and the intelligent layman. It is scarcely necessary to detail the scope of the book, but perhaps one should mention that the two longest chapters are on impotence and sterility,

and that these chapters are written principally from the medical point of view. The chapter on the difficulties of marriage—useful as it will be to the medical man—should be read by every educated man who is contemplating matrimony, and by many of those who have achieved it, but who have brought 'to marriage not knowledge, but a collection of social taboos, and personal prejudices that for them have the sanctity of revealed religion'.

The writer has a masterly style so unusual in this form of literature. Except in the minor matter of punctuation, we have no criticism whatsoever to offer, and we can whole-heartedly recommend the book to our readers.

Abstracts from Reports

LEAGUE OF NATIONS (INFORMATION SECTION). THE LEAGUE OF NATIONS AND LEPROSY. BY DR. ET. BURNET, JULY 1934

This article by Dr. Burnet should broaden one's outlook on the magnitude of the leprosy problem not only in India but all over the world. The institution of a centre for leprosy investigation in South America where race, customs and general climatic conditions differ from those prevailing here should open up the possibilities of new discoveries in virtue of its peculiar qualifications. As this new centre will be under the direction of the League of Nations, this will ensure its activities being correlated with those of other centres in the East.

In turning its attention to leprosy, the League of Nations has taken up one of the problems which have caused the greatest concern to the human race. Leprosy is a celebrated disease. From the remotest antiquity it has afflicted the world and the great geographical discoveries from the fifteenth to the seventeenth centuries have widened its domain. It has never ceased to be an object of terror to the peoples, a problem for the medical profession and a source of worry to governments. It was in order to cope with leprosy that the isolation of infectious patients was invented. In the Middle Ages it occupied a place at least as important as tuberculosis in the modern world. Many people, especially in Europe where they believe themselves to be no longer threatened, imagine that leprosy is now of interest only to dermatologists and specialists of exotic diseases. The truth is that there are at least 5 million lepers in the world, that in many countries leprosy is actively endemic with an occasional epidemic flare-up, and that, owing to the great amount of travelling and trade exchanges in the modern world, there is a steady, although not a very considerable, stream of infection coming into Europe.

The *British Empire Leprosy Relief Association* (B. E. L. R. A.) works in the British Empire, more especially in Africa, and through the medium of a special branch in India, where there are one and a half million lepers. The *Leonard Wood Memorial for the Eradication of Leprosy* (headquarters in New York) concentrated at first on the Philippines, but contemplates extending its action to other tropical regions. The *Mission to Lepers* (London) works in India, China and Africa. The *American Mission to Lepers* (New York) has branches in nearly all leprosy-infected areas, more especially China, Japan and South America; it has even endowed an institution in France, and has been instrumental in the organization of the *Chinese Mission to Lepers* (Shanghai). Italy has the *Opera Francescana internazionale*. Brazil, France, the Netherlands East Indies, the Philippines and Belgium have their (lay) societies for the relief of lepers and defence against leprosy. Several Catholic and Protestant religious orders—the Franciscan Sisters of Mary, St. Paul of Chartres, St.

Vincent de Paul, the Rhineland Mission—there is no space to mention them all—send to every quarter of the globe their missionary brothers and sisters without whom innumerable lepers would be abandoned.

Leprosy being a world-wide disease and a source of anxiety to all governments, whether in their own territory or in dominions, mandated areas and colonies, it is both natural and necessary that the League of Nations should take a prominent part in this international work. The multiplicity of existing organizations is an argument for rather than against such a course.

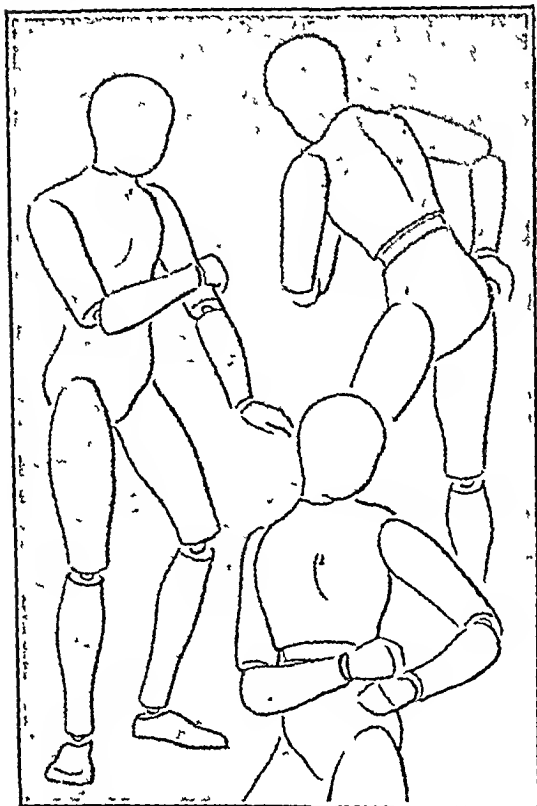
In 1923 the International Conference at Strasburg voted a resolution appealing to the League of Nations, which was then starting its great health work, to organize international machinery for the anti-leprosy campaign. In 1928, Brazil, greatly concerned by the recrudescence of leprosy in certain foci on its territory, requested the League of Nations to undertake a statistical and epidemiological enquiry on leprosy in the world. In 1926, Brazil proposed the creation of an international centre for the study of leprosy at Rio de Janeiro.

Brazil made to the League of Nations a proposal for the creation of an international study centre at Rio de Janeiro. The Federal Government offered an annual subsidy. Dr. G. Guinle, a philanthropist who has created admirable health institutions at Rio for the campaign against syphilis and cancer, offered a subsidy equal to that paid by the Government. The League of Nations consented to participate by means of research and travelling scholarships. The plan, although delayed by the world crisis, was nevertheless carried into effect in 1934. South America, in its turn, now possesses the centre which was the only leprosy region to lack it, and it is an international centre founded by Brazil under the auspices of the League of Nations.

Like similar institutions—the Institute of International Law, the International Institute of Agriculture, the Educational Cinematographic Institute, the International Institute of Intellectual Co-operation—the International Centre for the Study of Leprosy has one of the League committees as its governing body, in this case the health committee; the committee of management, working on the spot, consists of representatives of Brazil and other leprosy countries of the South American continent, namely, Argentine and Colombia. The director of the centre is a distinguished Brazilian scientist, Dr. Carlos Chagas.

The Rio centre must be a centre of scientific research. It is not qualified to intervene in the administrative organization of prophylaxis and treatment. Its statutes contain nothing which might lead to difficulties for the responsible authorities.

It will find admirable resources for its work in Brazil, comparable to those at the disposal of the Calcutta, Philippines, Japanese and Hawaiian centres. A leprosy hospital has been specially equipped by



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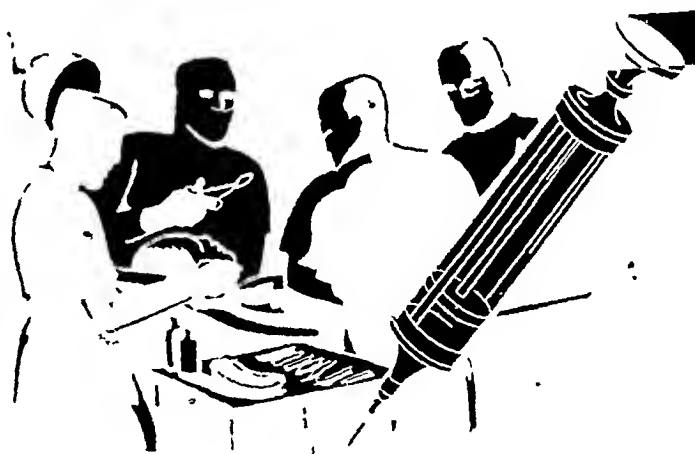
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the Federal Health Department to serve as a clinic. Five large modern leprosy hospitals, while remaining independent of the centre, will be open to research workers.

The general programme of work is governed by the state of our knowledge of leprosy and by the questions raised by leprosy practice. It is divided into three sections: clinical research and epidemiology; biology (bacteriology, serology, experimental medicine); chemistry, therapeutics and therapeutical chemistry.

THE ANNUAL REPORT FOR 1933 OF THE NATIONAL ASSOCIATION FOR SUPPLYING MEDICAL AID BY WOMEN TO THE WOMEN OF INDIA (COUNTESS OF DUFFERIN'S FUND INCLUDING THE WOMEN'S MEDICAL SERVICE)

This report which has just been published contains a comprehensive survey of medical work by women in India. Only a small excerpt can be taken from this report which covers a large field. The attention of the medical profession should be directed to one important branch namely child-welfare.

Maternity and Child-welfare Department, All-India Institute of Hygiene

Dr. Orkney writes:—Government sanction for holding a diploma course in maternity and child-welfare was obtained on 28th August, 1933, and the classes started on 15th October, with three students in attendance.

The arrangements made with the Presidency General Hospital for instruction in children's diseases has been most satisfactory. The Ante-natal Clinic at the Dufferin Hospital also affords abundant material and excellent teaching but individual instruction has been somewhat difficult because of the large number of patients attending and the limited accommodation in the out-patient department. Next year it is proposed to select 6 to 8 patients each session who will be examined under the direct supervision of the medical superintendent.

The facilities for post-graduate experience in advanced midwifery at the Eden hospital, so far as lectures and bed-side clinics are concerned, are good and practice in the administration of anaesthetics adequate but the opportunities for actual performance of obstetric manipulations are very limited. Practice in midwifery is a most important part of the training; the Eden hospital is the most suitable place in which to gain experience and it will be extremely unfortunate if the necessary changes cannot be made to bring the post-graduate practical work up to a reasonable standard. The period of internship ought to have finished in December, but owing to the late start of the course and the difficulty of getting abnormal midwifery cases, the students will continue to attend until each has conducted the necessary number of obstetric operations.

Accommodation in the Women Students' Hostel is limited and for future courses a possible alternative arrangement in the old Nurses' Quarters has been suggested by the Principal of the medical college.

Lectures and demonstrations in general hygiene, public health chemistry, ante-natal care and the organization of midwifery services have been given throughout the term at the All-India Institute of Hygiene and Public Health.

Part II of the diploma course will commence in January, 1934.

Maternity and child-welfare.—A maternity and child-welfare scheme designed to link up with the school medical service on the one hand and environment hygiene on the other, and to give the students a clear picture of the co-ordination of all the services for the promotion and maintenance of health came into operation in Ward 8, in May 1933. Those interested in the work being done by this service would do well to read this report.

ADMINISTRATIVE REPORT OF THE DIRECTOR OF MEDICAL AND SANITARY SERVICES FOR CEYLON FOR THE YEAR 1933. BY DR. R. BRIERCLIFFE, DIRECTOR OF MEDICAL AND SANITARY SERVICES

This report which contains a considerable amount of material on every branch of medical work in Ceylon should be consulted by those interested. Some of the general remarks should be of general interest.

General remarks.—The year 1933, like its two predecessors, was a healthy year. Although the general death rate (21.2) was a fraction higher than the record low death rate (20.5) of the previous year, the infant mortality rate (157 infant deaths per 1,000 births) was the lowest there has yet been, the birth rate increased from 37 to 38.6 and the excess of births over deaths (94,342) was greater than in any previous year.

Apart from smallpox and plague there were no serious outbreaks of infectious disease, though the typhoid rate still remained comparatively high. Owing to favourable climatic conditions malaria was less prevalent than in any of the past ten years with the possible exception of 1927.

At the end of the year a grant of Rs. 6,000 was kindly given by the International Health Division of the Rockefeller Foundation to enable an epidemiological investigation of typhoid fever to be made in the area of the Kalutara Health Unit. This investigation has since been started. The department is also indebted to the Rockefeller Foundation for a grant of Rs. 5,000 to be used as a 'Revolving Fund' for supplying cement concrete squatting plates of standard design for latrines in rural areas. The plates are sold at cost price to villagers who pay for them in small monthly instalments collected by the headmen or co-operative societies. From the end of March 1933, Rs. 1,800 had been loaned from this fund and 3,362 latrines plates provided. A Rockefeller Fellow was awarded to a government medical officer in October 1933 to allow him to undergo a scientific training in helminthology at the Calcutta School of Tropical Medicine and the Imperial Institute of Veterinary Research, Muktesar.

The leprosy survey of Ceylon, for which two officers had been trained and preparations made in 1932, started in the eastern province. Thanks to a visit of six weeks by Dr. R. G. Cochrane, secretary of the Empire Leprosy Relief Association, the leprosy problem in Ceylon has received a very thorough review and the policy now adopted as the result of his investigations and advice, should in the course of one or two decades bring about a very material diminution in the amount of the disease. The two survey officers are doing much more than merely finding new cases. In each area that they survey they train the department's medical officers, apothecaries and sanitary inspectors to recognize and deal with early cases of the disease, they arrange for the isolation in one of the two leper asylums of infective cases and they leave behind a local organization for the care and treatment of non-infective cases, for the 'follow-up' of old arrested cases and for the periodic examination of contacts. Since completing the survey of the eastern province where 46 new cases were discovered, the two officers have made a survey of Colombo and found there 230 new cases. The reports of Dr. Cochrane and of the leprosy survey officers have been published by Government in the form of a Sessional Paper II of 1934.

Valuable progress has been made in school, medical and health work during the year under review. Reference to section III A (3) will show that a policy for future work has been formulated and the machinery for putting that policy into effect arranged, and though the actual numbers of schools and school children dealt with may be small when compared with the total numbers in Ceylon (8,000 schools and 600,000 school children) an organization has been

provided which is capable of progressive development. In the towns dental trouble is the commonest cause of absenteeism and in Colombo a careful dental survey of school children has been made by the school medical officer who possesses qualifications in dentistry as well as in medicine. He has found that 76 per cent of the children in Colombo schools have dental defects which require attention and through his influence some of the larger schools and colleges have recently arranged excellently equipped dental clinics within their own buildings. Another important investigation started during the year has been the inquiry by the Director, Bacteriological Institute, into the signs of dietary deficiencies in school children (section IX). The department of education working in conjunction with the health education section of the medical department, has established a very practical system of health education in the vernacular schools of the island—the pupil throughout his whole school course is made to practice the health habits which he has been taught.

The Indian population on estates decreased from 741,289 in December 1929, to 609,170 in December 1933, as the result of the depression, but during this period, in spite of lower wages and unsettled conditions of work, the health of the estate population has steadily improved. In 1933, the death rate was 2.3 lower than that of the general population, the birth rate of 39.4 was much above the average of the past few years and the infant death rate of 181 is the lowest yet recorded. In September 1933, however, with improving trade conditions, the recruitment of labour from India began to revive and recently the rate of immigration has been almost 5,000 a week. With this large influx of new labour, health conditions on estates are likely to be adversely affected and higher sickness and death rates are to be anticipated for the next few years.

The infant death rate on the other hand appears to be declining more rapidly and steadily and the improvement must be attributed in some measure to the gradual dissemination of knowledge about infant care and hygiene from the numerous health centres and child-welfare clinics now established in Ceylon.

Definite improvements have continued to take place in teaching arrangements and facilities at the Ceylon Medical College and the hospitals associated with it. The reports and correspondence on the college since Sir Richard Needham's visit of inspection in March 1932, have been published by the Government as a Sessional Paper VI of 1934. The important influence which a good standard of training not only for doctors but for apothecaries, nurses, sanitary inspectors, and midwives will have on the quality of the work and services to be rendered by the medical department in the future cannot be too strongly emphasized. The training given to medical students has undoubtedly improved recently and is likely to improve still further as additional staff and buildings are provided.

REPORT OF THE EUROPEAN MENTAL HOSPITAL, RANCHI, 1933. BY LIEUT.-COLONEL OWEN A. R. BERKELEY-HILL, M.A., D.M. (OXON.), I.M.S., MEDICAL SUPERINTENDENT

THIS report, apart from interesting data about the incidence of the different types of mental disease, discusses the after-care system for discharged patients and the results of some of the more modern methods of treatment.

After-care of discharged patients.—Our 'follow-up-letter' system continues and the reports of the ex-patients received from themselves as well as from their guardians have been satisfactory.

In Calcutta, the Ranchi After-care Home (Bengal Presidency Council of Women), 62, Hazra Road, Ballygunge, and Toc H. Mark I (India), 2-2, Lansdowne Road, have continued to inspect periodically, and report on, the home conditions of the

discharged patients and give them the necessary advice and help. I tender my best thanks to them.

Treatment of mental disorder.—Special method of treatment.—During the year, the following special methods of treatment were carried out:—

(a) *Hydrotherapy.*—This form of treatment as instituted some years ago in this hospital in a manner which was then, I believe, unique, continues to show satisfactory results. During the year fourteen cases were treated of whom seven were subsequently discharged while the maniacal excitement of five others was considerably reduced.

(b) *Induced malarial fever.*—One case of acute mania was treated with blood taken from another person suffering from malaria (benign tertian). The immediate result was a slight improvement which has subsequently been maintained.

(c) *Prolonged narcosis.*—(Somnifen injections).—Three cases were treated in this manner. One was discharged cured. No improvement took place in the other two, one of them being a case of epilepsy with excitement.

(d) *Injections of sulfosin.*—Four patients were treated. Three recovered and were subsequently discharged. This form of therapy has the disadvantage of being extremely painful.

(e) *Somnifen.*—(Oral administration).—Two cases were treated with doses of somnifen by mouth (*m* xx thrice daily). Both cases were suffering from acute maniacal excitement. The treatment produced marked improvement.

(f) *Laudanum.*—(Orally).—One case of acute confusional insanity was treated with *m* xv doses of laudanum thrice daily, but no improvement was observed.

(g) *Glandular therapy.*—Three cases were treated with mixed glands. Two of these cases were suffering from schizophrenia. Of these one improved sufficiently to be discharged home. The other case showed a temporary remission of symptoms sufficient to permit of the patient being sent home on parole for a short time. The remaining case showed no change at all.

(h) *Cocaine following etherization.*—During the year, a report on some recent work of an eminent French woman psychiatrist in Paris came to our knowledge. The *raison d'être* of this form of treatment is the lowering of the strength of the forces of repression and the stimulation of the unconscious during light narcosis with a view to effecting contact with buried complexes and memories. This French observer had published a report on a series of investigations with different drugs known to be capable of stimulating and increasing psychic activity. The drugs she found most efficacious in this respect were cocaine and ether. One patient—a woman—was selected for this form of treatment. The results were eminently satisfactory and she was discharged shortly afterwards. Since her discharge she has written cheerful re-assuring news of herself. Prior to her admission, she had attempted suicide five times.

(i) *Serum therapy.*—Activated horse-serum was thrice injected in doses of 5 c.c. in a case of very severe epilepsy. The results were entirely disappointing.

One case of encephalitis lethargica with a Parkinson syndrome was treated with stramonium in the form of 2½ grs. pills. No effect followed this treatment.

(ii) *Occupational therapy.*—During the year, 43 patients were discharged as recovered or improved, all of whom had undergone occupational therapy. Of the twenty-four male patients, ten were treated in the carpentry section, six in the weaving and rug-making section, four in the cane section and one in the cookery section. The following additional occupations were introduced for women patients during the year:—

(1) Sealing-wax craft on account of the special attraction of the colour-schemes which it presents.

(2) Machine art-embroidery which is both interesting and creative.

(3) Dress-making. The latter appeals strongly to female patients.



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ANNUAL REPORT ON THE HOSPITALS AND DISPENSARIES IN THE CENTRAL PROVINCES AND BERAR FOR THE CALENDAR YEAR 1933. BY COLONEL N. M. WILSON, O.B.E., I.M.S., INSPECTOR-GENERAL OF CIVIL HOSPITALS, CENTRAL PROVINCES

Number of hospitals and dispensaries

The number of hospitals and dispensaries at the close of the preceding year was 327. During the year under report, cheap-plan dispensaries were opened at Borakhedi in the Buldana district and at Patunbori and Fulsongi in the Yeotmal district. A dispensary was also opened at the Government Press, Nagpur, in order to give medical relief to the staff working there, and one at the Baraduar limestone quarry in the Bilaspur district. Subsidized dispensaries at Ner Pinglai in the Amriti district and Arni in the Yeotmal district, and one city branch dispensary of the Murr Memorial Mission Hospital at Nagpur, i.e., three in all, were closed during the year. The Mission Dispensary at Panagar in the Jubbulpore district was transferred from class IV (private-aided) to class V (private non-aided). Thus, the number of hospitals and dispensaries open in the province at the close of the year 1933 was 329 of which 164 were rural and 165 urban.

Number of patients

The total number of indoor patients treated in the state-public, local fund and private-aided hospitals and dispensaries increased from 34,035 in 1932 to 35,507 in 1933 and the average daily attendance from 1,312.66 to 1,415.05. The number of beds available rose from 2,112 to 2,163 or an increase of fifty-one, forty-eight of which were on the female side, viz, Victoria Hospital, Jubbulpore (20), Mission Hospital, Seoni (12), Main Hospital, Bhandara (7), Mayo Hospital, Nagpur (8), and Waraseoni dispensary, district Balaghat (1). There were 1,416 deaths during the year against 1,405 in the preceding year, the ratio thereof to the total number treated being 3.99 against 4.13 per cent during the last year. Of the total number treated during the year 5,127 were police cases, 1,221 paupers and 3,033 medico-legal cases against 5,328, 1,176 and 3,280, respectively, in the preceding year.

The number of outdoor patients treated in these hospitals and dispensaries decreased from 2,996,603 in 1932 to 2,871,962 in 1933 and the average daily attendance from 20,281.62 to 19,979.12. This decrease is partly due to the general health of the province being comparatively better than that of the past year and partly to the introduction during the year of the half-anna ticket system which has affected the attendance, especially in the outlying dispensaries in which people who frequently used to seek medical relief for minor complaints have stopped doing so to avoid payment.

Infectious diseases

The infectious diseases show an increase over the past year's figures under the following heads:—Influenza (8,288), leprosy (3,394), cholera (829), gonococcal infection (513) and pneumococcal infection of lung (366). Two hundred and thirty-seven patients were treated for smallpox against 280 during the previous year. Of these 73 were vaccinated, 74 were unprotected, while the vaccinal condition of the remainder was not known.

Venereal diseases

The total number of in- and out-door patients suffering from venereal diseases treated in all classes of hospitals and dispensaries rose from 31,749 in 1932 to 32,328 in 1933.

The treatment of cases of venereal disease in the branch dispensaries is most unsatisfactory owing to lack of drugs and equipment. The Civil Surgeon, Raipur, suggests that the leprosy specialist and leprosy duty assistant medical officers, all of whom are attached to the Public Health Department, should be

turned into venereal specialists as there is much venereal disease. The result of treatment in venereal cases is much better and the attention paid to leprosy by missionary institutions is considerable. The Commissioner, Chattisgarh division, while agreeing with the Civil Surgeon that the question of venereal disease is certainly a very important one in that division, states that it might be possible to have a staff that could deal with both of these scourges instead of only one.

Antirabic treatment

Antirabic treatment was carried out as usual at the five centres, viz, Nagpur, Jubbulpore, Raipur, Hoshangabad and Akola, where 1,655 patients were treated during the year against 1,517 in the past year.

Ticket system

With a view to improving the financial position, the proposal to charge a fee of two pice on each new patient, excepting paupers and those covered by paragraph 341 (4), (5) and (7) of the Central Provinces Medical Manual, at all the main hospitals, including provincialized ones, and the dispensaries managed by the dispensary fund committees, was given effect to during the year and a report on its working submitted to Government. As it has been found that this system has adversely affected the outdoor attendance in outlying dispensaries, the local Government, while sanctioning the continuance of the experiment for another year, has left these dispensaries from its operation.

Correspondence

NORMAL SALINE IN CHOLERA

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR,—I wish to draw the attention of your readers to a very simple and efficient method of administering normal saline either in cholera or other conditions of dehydration, after operations, etc.

The method one usually resorted to in cholera is intravenous transfusion which is often not only difficult but sometimes wellnigh impossible in the circumstances in which a medical man or woman has to work in a village or even in the poor hamlet of an ordinary head-quarter town. Further, intravenous transfusion is unnecessary in most cases, for one has to have recourse to it in cases of collapse, or when the pulse is, hardly, or not, perceptible at the wrist.

The method I devised in 1912 when on duty as a plague medical officer in the Central Provinces.

The following are needed:—

(1) A big enamel bowl, an aluminium or a brass *dekchi* or other suitable container (at a pinch) will serve the purpose for boiling water. (2) Water (preferably distilled or rain water) to make normal saline in the proportion of one drachm of sodium chloride (common table salt) to a pint of water. The saline can also be prepared by dissolving three tablets (hypertonic solution tablets made by Parke, Davis and Company or Burroughs Wellcome and Company) in a pint of water.

The saline is injected subcutaneously not by a needle attached to a rubber tubing with a funnel or flask at the other end, but by a 100 c.cm., 40 c.cm., 20 c.cm., 10 c.cm. or 5 c.cm. syringe (the smaller the syringe the more the manipulation required on the part of the medical officer). After washing the skin with soap and water and painting it with tincture of iodine, the whole thickness of the skin with the subcutaneous tissue either in the abdominal flank or other suitable area is pinched up and the needle (preferably a long one

with a thick bore) attached to the syringe is pushed well in almost to the hilt, and the saline injected. The syringe is now detached leaving the needle in position on the patient, refilled from the bowl or *dekchi*, adjusted again to the needle and the fluid injected. This process is repeated until, in the adult, a pint or so of saline is transfused on each side of the flank according to the requirements of each case (which will be indicated by the pulse, general condition, cramps, etc.); in the adolescent half a pint or more on each side, in the child four or five ounces or more on each side according to the age and the needs of the patient. The needle punctures are sealed with cotton-wool dipped in tincture benzoini composita (Friars' balsam) or collodium flexible. The transfused fluid is dissipated by gentle massage, thus expediting absorption from the injected tissues and rapid improvement in the patient's general condition.

In a severe case I administer two pints at a time three or four times in the 24 hours; in a case of moderate severity two pints twice daily usually suffice.

It is my practice to give an initial injection of strychnine and digitalin and subsequently strychnine alone every three or four hours to support the heart. I have found this procedure uniformly very satisfactory. Atropine sulphate—grain 1/100—injections are also useful when purging and vomiting are very frequent. This may be given along with the saline.

When on the subject of cholera one might say a word or two about Tomb's (essential oils) cholera mixture. I have used it almost from the very time that Tomb published his experience with this in Egypt and India and I found that fifteen-minim doses every half an hour give far better and more satisfactory results, in respect of rapid and more cures, than one-drachm doses every hour advocated by its author. The large dose of one drachm is not tolerated by the stomach as well as is a quarter-drachm dose and the results with this smaller quantity are certainly more encouraging than with the larger, while the patient feels decidedly happier. Half-drachm doses may be given after some hours if thought necessary, but I have seldom had occasion to use the larger dose. Tomb's mixture is also beneficial in diarrhoeas.—Yours, etc.,

A. F. W. DE COSTA, F.R.C.S., D.T.M.,
L.M.S., V.D. Major.

KAMPTIE ROAD,
NAGPUR, CENTRAL PROVINCES,
1st August, 1934.

MEDICAL COLLEGE CENTENARY CELEBRATIONS

APPEAL

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR,—The Medical College Centenary celebrations will occur on January 28th to 31st, 1935. In this connection it is very desirable that the members of the staff of the College and former students should come forward with medical papers to be read at the morning sessions on the 29th, 30th and 31st. Such papers should be either (a) papers dealing with the history of the College and its development or (b) brief medical papers of practical interest in such subjects as medicine, surgery, gynaecology, ophthalmology, etc. It would also be desirable to exhibit interesting clinical cases.

May I appeal to you for help and collaboration in this matter? As the time will be limited, papers should be brief, or capable abstracts only being read.

In addition to the reading of papers and showing of clinical cases, it has been decided to have a medical exhibition, which will probably be housed in the pathology and physiology departments.

In this connection I would again appeal for your help and collaboration. Exhibits should be, as far as possible, self-explanatory with clear letter-press, and, as the amount of accommodation is limited, only the very best and most suitable materials should be exhibited.

As the programme has to be prepared well ahead, may I ask for an early reply?—Yours, etc.,

M. N. DE, M.B., M.R.C.P.,
Secretary and Convenor, Scientific
Sub-Committee,
Medical College Centenary.

MEDICAL COLLEGE HOSPITALS,
CALCUTTA,
25th September, 1934.

Service Notes

APPOINTMENTS AND TRANSFERS

LIEUTENANT-COLONEL M. D. WADIA, Civil Surgeon, is posted to Ambala on return from leave, with effect from 4th September, 1934.

Major A. Y. Dabholkar, M.C., is appointed to officiate as Director of Public Health for the Government of Bombay, with effect from the 14th March, 1934.

Major D. R. Thomas, O.B.E., Officiating Imperial Serologist, Calcutta, is appointed as Chemical Examiner to the Government of Punjab, Lahore, with effect from 6th September, 1934.

Captain W. McAdam is appointed temporarily to officiate as an Agency Surgeon and is posted as Chief Medical Officer in the Western India States Agency, Rajkot, with effect from the forenoon of the 4th August, 1934.

The services of Captain R. M. Lloyd Still are placed temporarily at the disposal of the Government of Burma, with effect from the 10th September, 1934.

Lieutenant C. B. Miller is restored to the establishment, dated 2nd August, 1934.

To be Lieutenants (on probation)

E. C. Rowlette, 1st August, 1934. (Seconded).

W. J. Virgin, 1st August, 1934, with seniority 1st August, 1933.

J. Brebner, 1st August, 1934, with seniority 1st August, 1933.

H. W. G. Staunton, 1st August, 1934, with seniority 1st August, 1933.

J. D. Gray, 15th August, 1934.

LEAVE

Lieutenant-Colonel K. G. Gharpurey is granted leave for five months and seven days, in India, with effect from 5th October, 1934, or subsequent date of relief.

Captain G. B. W. Fisher, Civil Surgeon, Rajshahi, is allowed leave for three months, and furlough under the military rules for five days, with effect from the 24th October, 1934.

PROMOTION

Captain to be Major

C. V. Falvey. Dated 17th April, 1934.

Lieutenant (on probation) to be Captain (on probation)

J. J. Barton. Dated 1st August, 1934.

RETIREMENT

Lieutenant-Colonel T. F. Owens retires 8th October, 1933

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RELINQUISHMENT OF APPOINTMENTS

Lieutenant W. J. Poole relinquishes his probationary appointment on 4th August, 1934.

Lieutenant J. M. Davidson relinquishes his probationary appointment on 1st August, 1934.

Notes

THE WELLCOME RESEARCH INSTITUTION,
LONDON, ENGLAND

Exhibit at the Chicago Exposition, 1934

THE attention which is being devoted to research is typified by the exhibit of the Wellcome Research Institution, founded by Sir Henry Wellcome. The large scale model exhibited of the magnificent building erected in London (Eng.) gives some idea of the founder's devotion to research and his determination that adequate and worthy headquarters should be available for the three research laboratories and the two research museums which bear his name. The corner stone of the Wellcome Research Institution was laid by Lord Moynihan, President of the Royal College of Surgeons of England, in 1931.

The Wellcome Research Institution embraces the Bureau of Scientific Research, the Entomological Field Laboratories, the Physiological Research Laboratories, the Chemical Research Laboratories, the Museum of Medical Science and the Historical Medical Museum, all of which are located in the new research building except the Wellcome Physiological Research Laboratories, which are at Langley Court, Beckenham, Kent (Eng.), with grounds of more than 100 acres of park land; and the Wellcome Entomological Field Laboratories, which are situated in spacious open country at Claremont, Esher, Surrey (Eng.).



Wellcome Research Institution, London (Eng.)
Chicago Exposition, 1934.

Part of the exhibit showing Booths 1 and 12, group H, in the foreground and Booths 13 and 24 in the distance. On the extreme left is a model of the Floating Research Laboratory presented by Sir Henry Wellcome to the Wellcome Tropical Research Laboratories, Khartoum. It is a two-decked vessel and is so fully equipped that it operates as efficiently as any modern scientific research laboratory on land. It is believed to be the first of its kind in the world and enables research work to be carried out on the course of the Nile and its tributaries at places otherwise difficult or impossible of access to the research worker. In the centre is a model of the Wellcome Research Institution founded by Sir Henry Wellcome.

The Wellcome Research Institution exhibits, in addition to the model referred to above, a screen bearing photographs illustrating the Army Medical Motor Field Laboratory presented to the British War Office and attached to the Expeditionary Forces in Palestine, Mesopotamia and Egypt during the Great War. It shows also notable exhibits from the Wellcome Tropical Research Laboratories, Gordon Memorial College, Khartoum, including a model of the Floating Research

Laboratory used on the Nile and its tributaries, and copies of the research reports illustrating the scientific and economic work carried out.

They also have on view some very beautiful enlarged models of disease carriers. Particularly interesting is that showing the tsetse fly—the agent responsible for the transmission of sleeping sickness. Included in this exhibit is a large scale model of the fly's biting apparatus. Amongst other models: *Anopheles costalis*, the mosquito most largely concerned in the transmission of malaria in Africa, and also the plague flea. In each case stages from egg to adult are shown, all upon a greatly enlarged scale so that details may be plainly seen.

Other exhibits depict contributions by the Bureau to the study and research upon diseases, particularly those affecting residents in tropical and subtropical lands. The Museum of Medical Science has exhibits which demonstrate the original system of visual teaching which enables it to give a general survey of human diseases from every aspect and thus makes it of such intense interest to medical men and of such outstanding service to students.

MENSTRUAL DISTURBANCES

MARTIN H. SMITH AND COMPANY have just issued a booklet on this subject which will be read with interest by members of the profession.

The beginning of menstrual troubles lies back somewhere in antiquity. Just when or where these troubles started are matters of little moment in comparison with the immediate needs of the sufferers who to-day are seeking relief.

Evidence is abundant that the unnatural mode of living which civilization has thrust upon us has placed an increasingly heavy burden on womankind. Particularly is this true regarding her most important function, reproduction. The further she departs from the dress, customs and habits of her primitive forebears the greater the penalty.

So common have become menstrual disorders that their diagnosis and treatment almost constitute a specialty in the field of medicine. The general practitioner finds a large proportion of his women patients coming to him with some menstrual complaint.

The forms most frequently presented are amenorrhea, dysmenorrhea, menorrhagia, metrorrhagia and those irregularities incident to the climacteric.

Ergoapiol is the preparation that is recommended in certain of these conditions; this consists of powdered extract of ergot, one grain, aloin, an eighth of a grain, apiol, a special preparation of this company, and Savin oil.

WATSON'S MICROSCOPE RECORD

THIS interesting little publication still maintains its standard, and in No. 32, the last number we received, the usual practical articles on the subject of microscopy will be found.

An article on the application of micrometric scales to photomicrographs will appeal to our scientifically-minded readers, and it certainly appeals to our editorial instincts, as, if the plan of the writer of this article were adopted, one of our main difficulties in the reproduction of photomicrographs would be overcome automatically.

He writes 'What a countless number of photomicrographs there must be whose value would be greatly enhanced if scales of measurement could be easily appended! A mere statement of the magnification of the image is very little use for the visual estimation of the size of microscopic objects. However, the provision of a micrometric scale, correct for that magnification, at the side of, or superimposed on the image, not

only enables visual estimation to be made with certainty, but also allows exact measurement to be made easily when required.

With lantern slides from photomicrographs it is extremely desirable that such scales should be shown, so that, irrespective of the initial or final magnifications, the dimensions of objects can be read off correctly when screened. A statement of the initial magnification alone is obviously inadequate to convey any idea of actual size or dimensions.

He suggests the use of a special micrometric rule (an illustration of which is given in the *Microscope Record*) by means of which a correct microscopic scale can be transcribed on to any photomicrograph or lantern slide.

Amongst the Watson's instruments described is a useful micro-projection apparatus for class work. For lecture-demonstrations of microscopic specimens no method is so satisfactory as projection on a screen. Every detail may be pointed to and it is only necessary to do this once for the whole class.

The most practical micro-projector yet devised is shown in the illustration. As will be seen, it is a strongly built microscope focusing by rack and pinion, with heavy cast-iron foot and large horizontal stage with plate-glass surface. Light is provided by a special sub-stage projection lamp consuming 36 watts and working at 12 volts, the current being obtained from a transformer connected by ordinary lamp flex to any A.C. house supply. A condenser is fitted above the lamp to illuminate a large field evenly and brilliantly. The projection lens is a triple achromatic combination giving a brilliant image magnified 80 diameters on a screen at 15 feet distance. The beam is reflected in a horizontal direction by a large prism which also corrects the transposition which occurs with simple projection on an opaque screen. The horizontal stage is more convenient for mounted objects than a vertical one, and is, of course, the only possible means of exhibiting unmounted objects or objects in fluid and chemicals in suspension or solution.

VITYS

ORIGINALLY the water-soluble vitamin B was considered to be a single substance. Recent work, however (Goldberger *et al.*, U. S. A. Public Health Report, 1926, XLI, 197; Guha, *Biochemical Journal*, 1931, XXV, 960; Reader, *Biochemical Journal*, 1929, XXIII, 689), has shown the existence of several factors, called B₁, B₂, etc., belonging to the water-soluble B group, all of which are necessary for health. Vitamins and specially B-vitamins are not stored in the system for long periods. So, for the maintenance of proper health, they have to be supplied to the system from time to time.

'Vity's', a tablet rich in the various factors of the vitamin-B complex and also in phosphate is manufactured by the Bengal Chemical and Pharmaceutical Works, Limited. It is designed to supplement the ill-balanced dietaries, specially with regard to the B-vitamin content and to make up for the general ill-health, and susceptibility to various ailments consequent to faulty nutrition.

'Vity's' has been biologically assayed by the technique described by Guha and Drummond (*Biochemical Journal*, 1929, XXIII, 880) whereby it has been definitely observed that rats receiving 'Vity's' show optimum growth.

From the clinical standpoint also 'Vity's' tablets have been found to be highly useful in all conditions of avitaminosis B, e.g., beri-beri, epidemic dropsy, pellagra, indifferent growth, neuralgia and other nervous disorders, gastro-intestinal trouble, skin affections, general ill-health and malaise. It is highly recommended for growing children and young people, for expectant and nursing mothers and for those who are easily fatigued after brain or manual work.

MARMITE

A RECENT report on the vitamin-B₁ content of a sample of marmite contained the following details:—

The vitamin-B₁ content of this sample of marmite was estimated by a direct comparison with the international standard for vitamin B₁.

Pigeons were given a diet of polished rice *ad lib.* and tap water; they were caged in a sheltered yard and were exposed to the open air throughout the experiment. The floors were covered with raised wire screens to prevent the pigeons from having access to faeces. Half the pigeons developed retracted neck, the recognized sign of vitamin-B₁ deficiency.

As each bird developed this symptom, it was put into a separate smaller cage and given either a dose of standard B₁ preparation or of marmite, alternate pigeons being given the standard vitamin and marmite, respectively. The results were judged on the number of birds cured and the average duration of cure.

It was evident from both methods of calculation that the dose of 0.1 gramme marmite had the same vitamin-B₁ potency as the dose of 0.03 gramme of the standard vitamin preparation.

The unit of vitamin-B₁ activity is defined as that amount of activity contained in 0.01 gramme of the international standard. Thus, it may be said that 0.1 gramme marmite contains 3 units of vitamin B₁. Therefore this sample of marmite contains 30 international units of vitamin B₁ per gramme, or about 840 units per ounce.

Publishers' Notice

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The Editors of *The Indian Medical Gazette* cannot advise correspondents with regard to prescriptions, diagnosis, etc., nor can they recommend individual practitioners by name, as any such action would constitute a breach of professional etiquette.

Original Articles

GENERAL PARALYSIS OF THE INSANE IN BURMA

By G. H. FRASER, M.B., CH.B. (Edm.), D.P.M. (Eng.)
MAJOR, I.M.S.

Superintendent, Mental Hospital, Tada-U, Rangoon

THE following account of the occurrence of general paralysis of the insane in Burma has been prompted by the belief which, so far as one can gather, is common, that parasymphilitic diseases are rare both in India and in tropical and sub-tropical regions generally.

References to this aspect of the subject are few. Power (1930) refers to the relative infrequency of general paralysis among uncivilized countries. Fletcher (Byam and Archibald, 1922) states that 'though syphilis is widespread in most tropical countries, the parenchymatous affections of the central nervous system are comparatively rare among native populations'.

This may be true of countries such as India, where, if this disease does occur, it does not manifest itself in the same way as in other communities. It has been stated by Dhunjibhoy (1930) that 'general paralysis of the insane is extremely rare in India, although syphilis is very common. I have not seen a case of general paralysis of the insane in an Indian, who has not been abroad'. This has been the writer's experience in India, and it is also the experience of many others who are competent to form a reliable opinion.

The relative rarity of general paralysis of the insane in India in association with the high incidence of malaria has led to the suggestion that general paralysis of the insane may occur in India in a modified form and so escape recognition. It may be admitted that aberrant clinical types of general paralysis of the insane may occur in India, but it has yet to be shown that such cases exhibit positive serological reactions. The writer's experience is that these cases invariably exhibit negative serological reactions.

The wide range of the clinical manifestations of general paralysis of the insane, which is a feature of this disease in Burma, renders it difficult to base a diagnosis on the clinical data alone. One must assume that some time during the course of the disease the results of serological tests would become positive. It is, however, conceivable that many cases are missed owing to the fact that they are modified by naturally-acquired malaria. That this may be so is supported by the fact that many cases recover completely or are only slightly reduced mentally as a result of treatment by malaria therapy. It may therefore be presumed that those cases subject to repeated infection of

naturally-acquired malaria exhibit a modified clinical picture. It is also to be expected that the chronicity of the disease will become more marked and the clinical signs modified. Here the usual criteria of diagnosis of general paralysis of the insane does not help us, for, as in the cases successfully treated by malaria, there may be no clinical data and the serological results may be greatly modified. The following serological results of successfully treated patients may serve as examples. These cases have returned to their former occupations and show no clinical signs of the disease.

Case no	Date of specimen taken	Serological results
1	26-4-1933	Wassermann reaction (C.S.F.) ++. Langé's colloidal gold test—555554200.
	2-7-1934	Wassermann reaction (C.S.F.) +—. Langé's test—0123210000.
2	14-8-1933	Wassermann reaction (C.S.F.) ++. Langé's test—555542100.
	2-7-1934	Wassermann reaction (C.S.F.) +. Langé's test—0132000000.
3	2-11-1933	Wassermann reaction (C.S.F.) ++. Langé's test—5555321000.
	7-7-1934	Wassermann reaction (C.S.F.)—negative. Langé's test—0132100000.

Assuming that these patients, instead of being treated by artificially-induced malaria, had been naturally infected and had had frequent attacks of fever while suffering from syphilis, they would not have been found insane, nor would they have shown any clinical signs, but the serological results would be found modified.

In such circumstances it may well be that general paralysis of the insane is more common than is generally supposed in tropical countries, but, whether this premise is correct or not, the facts to be recorded go to show that in Burma, where syphilis is far more prevalent than in most parts of India, the classical form of general paralysis of the insane is relatively common.

In Burma, no race of whatever origin is immune. Indians, who have lived out of India for some years, appear to be as liable to acquire parasymphilitic lesions as the indigenous races.

It would appear that by long residence in a malarious country one acquires an x factor which modifies the course, duration and clinical signs of the parenchymatous affections of syphilis, that, by long residence in a non-malarious country, this x factor is absent so that the reaction of the nervous system to syphilis takes the well-known form, and that, by migration from a malarious to a non-malarious country, one loses this x factor, it will follow that in a large moving population, such as one finds in Burma, many syphilitic individuals will be found in whom this x factor is complete, modified, or entirely absent.

This is a possible explanation of the varied manifestations of parasyphilis in this country. Some parts of Burma are malarious, others are non-malarious. The Rangoon area is non-malarious. More than half the population of Rangoon is non-Burman, consisting chiefly of Indians, some of whom have been residents in Rangoon for long periods; the majority, however, are temporary residents. The large proportion of Rangoon residents who have been born outside Rangoon, namely 510 per mille, is evidence of the fact that the population of Rangoon is largely composed of immigrant races.

In such a mixed population one finds cases of general paralysis which are rapidly progressive, others which take a mild and chronic course, and still others which are diagnosed, not on clinical grounds but as a result of laboratory tests. The following are examples:—

Case 1.—R. C., admitted on the 17th June, 1933; age 35 years, coolie, native of Madras. No history prior to admission obtainable. Sent to this hospital from the Rangoon General Hospital. Physique poor. Health poor, emaciated, neglected. On physical examination there is marked tremor of hands, facial muscles and tongue; pupils react sluggishly to light. Marked slurring of speech, gait stumbling, deep reflexes absent. Mental state:—Constantly restless, habits dirty, naked, speech incoherent. Wassermann reaction report ++ (blood and cerebrospinal fluid); Langé's test—paretic.

23rd September, 1933.—Convulsions resulting in a left-sided hemiplegia.

30th September, 1933.—Died.

Case 2.—Y. N., admitted on the 29th January, 1934; age 30 years, Chinaman, carpenter. Found wandering aimlessly in the streets of Rangoon, getting in the way of traffic; apprehended by the police who sent him to this hospital for observation as he was thought to be insane.

Physique and health good; pupils fixed; reflexes brisk, no tremors, gait normal.

Mental state:—Mildly euphoric; singing and laughing at times, at others threatening, abusive, aggressive.

Wassermann reaction report (blood and cerebrospinal fluid) ++; Langé's test—paretic curve.

Treatment:—Sulphosin, malaria, tryparsamide; great improvement. Discharged to the care of his relatives, 25th May, 1934; no physical signs, mentally sound, conduct and speech normal. Treatment continues.

Case 3.—Z., admitted on the 7th July, 1933; age 27 years; house servant (butler); Indian Christian (Madrassi).

Sent to this hospital from Maymyo by his relatives as he became aggressive and unmanageable at home 20 days prior to admission. No history of previous illness except 'fever'. Gives a history of occasional addiction to alcohol (toddy) and ganja; physique and health good. No physical signs of general paralysis of the insane.

Mentally he is quiet, seclusive, resents interference, occasionally mutters and grimaces, postures; has lucid intervals when he appears normal; occasionally euphoric, whistles, sings quietly to himself or dances gaily.

Blood and cerebrospinal fluid (Wassermann reaction report) ++; Langé's test—luetic curve; cells 18 per c.mm.

Treatment:—Sulphosin, malaria, tryparsamide.

Discharged 23rd February, 1934, cured.

Case 4.—Nga S. L., admitted on the 29th January, 1931; clerk; Burmese Buddhist; age 36 years; sent to this hospital from Rangoon Jail, found insane, acquitted of murder by the High Court of Judicature at Rangoon. It is said that he had killed his father with a *dah*.

He is known to have been insane for four months prior to the crime. The history includes addiction to alcohol, ganja and cocaine.

Prior to the crime he is said to have had delusions of persecution; of people coming to his house to injure him. One night his father wanted to go outside but patient would not let him, fearing that the people threatening him would get in. As his father persisted in going out the patient hit him over the head with a *dah* and killed him. When arrested he did not appear to be insane. When under observation in jail he was reported to be rational at times, but occasionally had outbursts of weeping or laughing. On admission to this hospital was unduly cheerful though conduct and speech were rational. His bodily health and condition were good; reflexes were normal; there were no tremors. He states that he remembers nothing of his crime. On the 5th May, 1932, he became excited, stated that some person was coming to murder him. On the 22nd July, 1933, he showed marked improvement; conduct and speech were rational. On the 16th January, 1934, he was noted to be dull and apathetic, without interest or social tendencies. No physical signs of syphilitic involvement of the nervous system were found. 17th May, 1934—a sample of patient's blood gave a positive reaction to the Wassermann test. A sample of the cerebrospinal fluid was then taken which gave a positive reaction. Cytological count showed 24 cells per c.mm. Langé's gold test gave a paretic curve. He was then given citrated malaria blood, reaction to which was good. Tryparsamide was then given. Marked improvement. Conduct and speech normal.

Case 5.—Mg. H. M., admitted on the 19th October, 1933; clerk; Burmese Buddhist; age 28 years. Was sent to this hospital by his parents who stated that patient had contracted syphilis when 22 years of age and has since had intensive treatment with novarsenobillon and allied arsenical preparations. On admission patient's general bodily health and physique were very poor, very thin and emaciated. Mentally he was dull and stuporose, could be roused but not sufficiently to make an intelligent reply. On physical examination his pupils were fixed, deep reflexes were not elicited.

Laboratory reaction:—Wassermann reaction (blood and cerebrospinal fluid) ++; Langé's test—paretic curve; protein more than normal; cell count 5 per c.mm.

Treatment:—Sulphosin—marked physical improvement. Citrated malaria blood—slight mental improvement. Tryparsamide—physical improvement. Mentally is bright and observant, is rational in speech and conduct.

On 16th March, 1934, discharged cured. Continues treatment.

This patient has been seen by the writer on many occasions since discharge. He has returned to his former occupation as a clerk. He is reported on well by his employer.

During the years 1931, 1932 and 1933 the numbers of admissions of cases of general paralysis have been 14, 28 and 62 respectively. These figures represent an average percentage of direct admissions of 6.25 per cent, 10.29 per cent and 19.447 per cent. During the first quarter of 1934, the number of new admissions of cases of general paralysis was 20, or 21.05 per cent of total admissions.

Diagnosis in each case was, apart from clinical signs, based on a positive result of the Wassermann test on the blood and cerebrospinal fluid, a paretic reaction by Langé's colloidal gold test;

cytological examination, and protein examination of the cerebrospinal fluid.

It may be noted here that it is the rule rather than the exception for these patients to show clinical and verbal evidence of primary infection.

From the year 1933 to the present date each new admission has been examined by the Wassermann test for evidence of syphilis and whether, from clinical examination, the signs of general paralysis were present or absent.

The nationalities of these cases are of speculative interest, keeping in view the fact that, with a few exceptions, all came from the Rangoon area, which, as stated, is a non-malarious area, and that in this area the majority of the population is non-Burman. No reliable information could be obtained regarding the period of residence of each case in this area. The figures are: Burmans (Buddhists) 59; Chinese 8; Indians (Hindus) 11; Indians (Mohammedans) 12; Indian Christians 3; Burmese Christians 1; Anglo-Indians 8; Persian 1; Shan 1.

It is of interest that no case of general paralysis has been admitted to this hospital who is known to have undergone military service.

The large number of Burman Buddhists admitted leads one to speculate as to the cause. The suggestion that first arises is that the permanent resident in the Rangoon area is not exposed to the same factors which render the Indian immune to the course of general paralysis as we know it. There is, however, the sociological aspect of this subject. Compared to the Indian, the Burman is apt to be mentally myopic; he lives for the moment. The Indian, on the other hand, is, generally speaking, more prudent in his outlook, and is ruled by so many religious and caste restrictions that there is a lesser tendency to promiscuity than is the case with the Burman.

The above figures should be compared with the figures given in the last census for the various nationals among the population of Rangoon town from which most of our cases come. The population of Rangoon is 400,415. Of this number, Burmans (Buddhists) represent 32 per cent; Indians, 63 per cent. The proportion of foreign born (out of Burma) is 509 per mille.

Of the above cases of general paralysis admitted during the years 1931, 1932 and 1933, 45 have died, 24 have been discharged and 35 remain in hospital. Of the cases discharged 15 have returned to their former occupations; the remaining, somewhat mentally reduced, are doing well, according to latest reports, and are usefully employed. Of the 35 remaining in hospital the majority show remissions, are employed in minor tasks, and are not discharged because the relatives are not traceable or are

so poor that the requisite amount of care and supervision cannot be provided.

The large proportion of deaths must be accounted for by the advanced state of the disease in which many are admitted. This is to be expected in a large moving population of male persons of the lowest labouring classes. Of the better class of patient whose relatives bring the patient in the early stages of the disease to the proper quarters for expert advice and treatment, the prospect of cure and return to their former occupations is good.

As regards diagnosis, in the majority of cases this is easy. A matter of interest sometimes arises in the early stages of the disease where physical signs may be absent and where the patient shows no sign of mental disorder under prolonged observation. The following is an example :—

Case 6.—M. P. S., age 40 years, Burman, admitted on the 9th June, 1934; under observation as to his mental condition. On the 26th April, 1934, while staying in a monastery (*phongyi Kyauung*) he caused the death of a monk (*phongyi*) by striking him on the head with a mallet. Said to have been insane for five days prior to the crime. After the crime he is reported to have been found laughing and crying alternately. He is said to have had his first attack of insanity 25 years ago. At the first enquiry the first witness stated that on the 22nd April, 1934, the accused felt unwell and began to talk nonsense. He could not be managed well. Next day he went out of his house shouting 'I am afraid' all the time. The witness had to keep him tied with irons. Next day the witness took him to a monk (*phongyi*) to have him cured. Witness no. 2 stated that the accused began to talk nonsense 5 or 6 days before the crime. He was insane at the time of his arrest. The magistrate on his examination observed that the accused looked insane. The civil surgeon had the accused under observation from the 21st May, 1934, to the 28th May, 1934, but found no signs of insanity. The accused behaved well at all times.

Admitted to this hospital for further observation on the 9th June, 1934. His health and physique were good. There were no signs of insanity. Speech and conduct were rational. Social tendencies were normal. He was alert and observant, orderly and active, and employed himself usefully each day. The general opinion of warders and attendants was that the patient was inclined to be solitary, only occasionally initiating conversation, but conversed in a rational manner when spoken to.

On examination the patient stated that he had been under treatment for insanity by two monks (*phongyis*) and a native doctor (*se-saya*) about ten days before the occurrence of the crime. He stated that he did not know about the crime. He only remembers being arrested by his villagers and charged with the murder. He did not know the names of the people who arrested him. He totally denies the crime and accused another person, San Aye, of the same village as the murderer of the monk. He said that San Aye struck the monk with a stick and then ran out shouting that the lunatic (the patient under examination) was attacking the monk. This occurred at the monastery. He did not know anything more about the crime until he found himself in the lock-up prior to this.

He denies having been insane twenty-five years ago or at any other time.

On physical examination no sign of disease or disorder of the nervous system was found.

On examination of the blood and cerebrospinal fluid the following results were obtained:—Wassermann reaction (blood and cerebrospinal fluid) ++; cell count 15 per c.mm.; protein increased; Lange's colloidal gold test—paretic curve. To exclude the possibility of error, further serological examinations were made with similar results.

The treatment adopted in these cases has followed well-known lines. Sulphosin, a 1 per cent emulsion of sulphur in olive oil, as advocated by Schroder, has been used here in debilitated, in elderly and in restless patients, who, it is found, respond badly to malaria. It is administered intramuscularly into the fascia lata of the thigh in increasing doses of 1 c.cm. to 4 or 5 c.cm. at intervals of forty-eight hours. A maximum dose of 10 c.cm. has been recommended but, with these patients, as 4 c.cm. or 5 c.cm. produces the same degree of pyrexia as 10 c.cm. the higher doses have not been given. A temperature of 101°F. to 103.5°F. is produced. A certain amount of local pain follows the injections. In the debilitated and elderly cases malaria pyrexia is not without danger from heart failure. Sulphosin has in our experience produced no undesirable effects, and in the majority of cases delays or arrests the progress of the disease, improves the general health and allows further treatment to be followed.

As many cases are admitted in a highly neglected bodily condition a period of rest with suitable diet and discipline is allowed before active medicinal treatment is begun.

Treatment by malaria pyrexia was given in selected cases with varying results. A patient suffering from malaria is obtained and films of his blood carefully examined to ensure that the infection is one of benign tertian and not malignant or mixed infection. With all reasonable precautions it is sometimes found difficult to exclude the possibility of a mixed infection, for on taking films of blood at hourly intervals between 3 p.m. and 6 p.m. no malignant tertian parasite may be found, and yet when the blood is injected into the patient, a mixed infection is found. This mishap has had unfortunate results in a few cases.

The incubation period in these cases varied from seven days to thirty days. Some patients showed no reaction even on repeated injections of malaria blood. Other cases had only a few pyrexial attacks and no further response. Most cases, however, reacted well and were allowed to have twelve pyrexial attacks. Quinine was administered to stop the pyrexia. Five grains to 10 grains of quinine injected intravenously was found effective to control the pyrexia. In those cases whose pyrexia subsided spontaneously after a few rigors, an injection of 1 c.cm. adrenalin chloride (1 in 1,000) or 5 c.cm. T.A.B. vaccine was found useful in provoking further pyrexia.

The occupation of 25 of these patients prior to admission was unknown; of the rest their occupations were:—

Coolie	..	..	15
Clerk	..	..	9
Motor driver	..	..	7
Bazaar seller	..	..	6
Carpenter	..	..	4
Farmer	..	..	4
Police constable	..	..	3
Trader	..	..	3
Tailor	..	..	2
Assistant to court registrar	..	..	2
Foreman electrical engineer	..	..	2
Wood-carver	..	..	2
Cloth merchant	..	..	2

and one each of the following:—township judge, assistant chemical examiner, tax collector, sub-assistant surgeon, school head-master, Burmese physician, railway restaurant manager, store manager, butler, typist, tin-smith, painter, professional gambler, fitter, hat maker, rickshaw puller, sweeper and shoemaker.

These cases represented most of the certifiable stages in the progress of the disease. Many were of the very poorest coolie class, brought in by the police in an advanced stage, having been found wandering or lying about the streets not under proper care or control. A few were of the better classes, and these, brought by their relatives when the patient was in the early stages of the disease, responded well to treatment. In this country, however, where in many circles insanity is still looked on as due to the malign influence of *nats* (evil spirits), the first appeal for treatment of insanity is to the Buddhist monks or unqualified native practitioners. When these fail after long periods of ineffective 'treatment', the patient is brought in a stage of the disease in which prospect of any great improvement is highly problematic. It is significant, however, that, with two exceptions, those who have recovered and have returned to their former occupations have been of the better classes or have received varying degrees of education. It will be seen from the following that, *pari passu* with the mental improvement, there are improved serological reactions. The cerebrospinal fluid of patients who have mentally regained normality was examined on the dates recorded in the table opposite; the first examination in each case being that taken shortly after admission to hospital, and the second examination in each case after treatment and discharge from hospital.

Six of these 'recovered' patients who reside in the Rangoon area or within the neighbouring districts continue to attend this hospital for further treatment. Steps have been taken to

have other 'discharged recovered' or 'remission' cases treated by their respective civil surgeons.

TABLE

Case no.	Date when specimen taken	Laboratory findings
1	26-4-1933	Wassermann reaction (C. S. F.) ++. Total leucocytes—6 per c.mm. Plasma cells not seen. Protein more than normal. Langé's colloidal gold test—555554200.
	2-7-1934	Wassermann reaction (C. S. F.) +±. Total leucocytes—3 per c.mm. Plasma cells not seen. Protein slightly more than normal. Langé's test—0123210000.
2	14-8-1933	Wassermann reaction (C. S. F.) ++. Total leucocytes—21 per c.mm. Plasma cells not seen. Protein more than normal. Langé's test—5555542100.
	2-7-1934	Wassermann reaction (C. S. F.) +. Total leucocytes—1 per c.mm. Plasma cells not seen. Protein slightly more than normal. Langé's test—0132000000.
3	25-9-1933	Wassermann reaction (C. S. F.) ++. Total leucocytes—12 per c.mm. Plasma cells not seen. Protein more than normal. Langé's test—2334310000.
	2-7-1934	Wassermann reaction (C. S. F.) ±. Doubtful. Total leucocytes—1 per c.mm. Plasma cells not seen. Protein normal. Langé's test—0121000000.
4	2-11-1933	Wassermann reaction (C. S. F.) ++. Total leucocytes—7 per c.mm. Plasma cells not seen. Protein more than normal. Langé's test—5555321000.
	7-7-1934	Wassermann reaction (C. S. F.)—negative. Total leucocytes—1 per c.mm. Plasma cells not seen. Protein slightly more than normal. Langé's test—0132100000.
5	20-11-1933	Wassermann reaction (C. S. F.) +. Protein more than normal. Total leucocytes—5 per c.mm. Langé's test—5555432100.
	2-7-1934	Wassermann reaction (C. S. F.)—negative. Total leucocytes—1 per c.mm. Plasma cells not seen.
6	30-11-1933	Wassermann reaction (C. S. F.) ++. Total leucocytes—7 per c.mm. Plasma cells not seen. Protein more than normal. Langé's test—555532100.
	22-5-1934	Wassermann reaction (C. S. F.)—negative. Total leucocytes—1 per c.mm. Plasma cells not seen. Protein more than normal. Langé's test—5555420000.

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THE PART PLAYED BY THE FEELING OF GUILT IN THE ÆTIOLOGY OF MENTAL DISORDERS

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THE study of the ætiological factors of mental disorder is leading to the discovery that the feeling of guilt plays a most important part in the genesis of a number of common disorders of the mind, ranging from feelings of inferiority up to severe psychoses. Hence no serious attempt at prophylaxis against mental illness can afford to disregard this emotional state of the mind. That guilt can be felt by certain animals, e.g., dogs, cats, monkeys, etc., is well known to everyone, but how this feeling arises and why some animals appear to feel it and others do not, is still insufficiently understood. Graham Howe, in his *Motives and Mechanisms of the Mind*, calls attention to the early association in the mind of the child of the moral

(Continued from previous column)

TABLE—concl'd.

Case no.	Date when specimen taken	Laboratory findings
7	12-2-1934	Wassermann reaction (C. S. F.) ++. Total leucocytes—7 per c.mm. Plasma cells not seen. Protein more than normal. Langé's test—5555543100.
	2-7-1934	Wassermann reaction (C. S. F.) ++. Total leucocytes—1 per c.mm. Protein more than normal. Plasma cells not seen. Langé's test—55555321000.
8	20-2-1934	Wassermann reaction (C. S. F.) ++. Total leucocytes—4 per c.mm. Plasma cells not seen. Protein much more than normal. Langé's test—5555310000.
	21-5-1934	Wassermann reaction (C. S. F.) +. Total leucocytes—3 per c.mm. Plasma cells not seen. Protein more than normal. Langé's test—4444210000.

REFERENCES

- Byam, W., and Archibald, R. G. (1922). *The Practice of Medicine in the Tropics*, Vol. II. Henry Frowde and Hodder and Stoughton, London.
- Dhunjibhoy, J. E. (1930). Brief Résumé of Types of Insanity commonly met with in India, with full description of 'Indian Hemp Insanity' peculiar to the country. *Journ. Mental Sci.*, Vol. LXXVI, p. 254.
- Power, T. D. (1930). Ætiology of General Paralysis of Insane. *Ibid.*, Vol. LXXVI, p. 524.

concepts of 'good' and 'evil' with the excretory function. A child is 'good' whose bowels function regularly at the behest of mother or nurse, and the child is 'bad' if it fails to do so. As Graham Howe observes, from the first day the child is born, the ordered exercise of this function is expected and for the most impressionable years of life it is associated with the moral qualities of 'good' and 'bad'. Apart from any psycho-analytical theories on this aspect of human development, the juxtaposition of the genital to the excretory zone must almost inevitably lead to a transference of the guilt-complex from the excretory to the genital area. It seems possible to throw some additional light on this interesting and important problem by applying thereto the theory of the 'conditioned reflex'. As Pavlov could produce the excretion of saliva in dogs who had been regularly fed at the ringing of a bell, by merely ringing the bell in the complete absence of food, are we not at liberty to imagine that our ethical and moral training 'conditions' us to frown or blush when, for example, something obscene or blasphemous is mentioned in our presence? If this be so, and future researches may well show it to be, then we have reached a really important discovery as to the psycho-physiology of the 'moral sense', i.e., it is nothing but a conditioned reflex. This view obtains support from the fact that the feeling of guilt is relative to the standard which authority imposes. In other words the reflex may be 'strongly' or 'weakly' conditioned. For instance, where the parental attitude towards the child is of the conventional 'hush-hush' type as regards excretory and sexual functions, only a measure of guilty feeling springs into existence; where, however, the parental attitude as well as the religious teaching of the child is in terms of sin and punishment, the guilt feeling is liable to become exaggerated to a very dangerous extent and thus becomes a very common source of subsequent neurotic development. It may not be possible to prove that all guilt in adolescence is fundamentally associated with sexual guilt even when it is apparently associated with some other cause, such as stealing or lying. Further, the feeling of 'guilt' is probably operative in the formation of that 'horror' of sexual facts which is so universal among civilized peoples. Whether this 'horror' is or is not a conventional artefact it is not easy to decide. The solution of the problem may lie in the anatomical relationship of the genital and excretory zones to which reference has already been made. Guyon, in his *Sex Life and Sex Ethics*, maintains that this 'horror' of sexual facts is partly the outcome of primitive mystic awe and partly to a sense of supernatural danger. On the other hand, it is just as likely, as Crawley observes in his *Studies of Savages and Sex*, to be a morbid psychosis akin to jealousy on the one hand and

disgust on the other. At any rate, this feeling, while absent among primitive people, is almost beyond dispute a definite mark of neurosis among the so-called civilized races. For example, a short while ago I was asked to see a young lad of sixteen whose intellectual activities were being held, as it were, in a vice composed of shame and guilt; these owed their origin to a habit he had got into of indulging in voluptuous day-dreams. These phantasies were so strongly obsessive in their character as to inhibit him from doing his ordinary school work. He regarded himself as wholly 'wicked' and 'unclean' and as such unfit to mix with his associates, especially with women. His condition was truly pitiful. Again, 'guilt' may have quite another but equally significant function, namely, to establish individual independence through rebellion against the dominance of authority. A boy who is persistently 'naughty' is probably trying to exercise his independence and he feels that one way in which he can do so is by disobeying authority. Authority expects us always to do the right thing, therefore a rebellious independence will show itself by a tendency always to do the wrong thing. Thus 'naughtiness' in young people is often purposive for they may choose to be 'guilty' as a means of exercising their independence. This state of affairs has much bearing on juvenile delinquency. The feeling of 'guilt' naturally evokes the idea of punishment and consequently the fear of it. It may even, somewhat paradoxically, evoke the desire for it. It must not be forgotten that all superstitions can be traced to their origin in a fear of punishment. To be dominated by superstition (and how few of us are not!) is to be dominated by unconscious feelings of anxiety and guilt, a state of mind that borders more closely upon a neurosis than most doctors realize. Since superstitions are based on a fear of punishment their main function is to deflect the impending punishment by an act of propitiation of a symbolical kind, e.g., 'touching wood'. In the full-blown obsessional neurotic this propitiatory mechanism is given the fullest expression to the end and it may develop to such a degree of intensity as to absorb almost the whole energy of life. The apparently ridiculous repetitions of hand-washing, touching objects or counting are not so purposeless as they may seem to be. An obsessional neurosis is therefore nothing more than a defensive propitiatory ritual, expressed symbolically, to avert the (unconscious) dread of punishment that has arisen through the existence in the individual of an intolerable feeling of guilt. The ordinary medical practitioner is invariably irritated through being completely baffled in the presence of an obsessional neurotic. He tries to compensate for his own misunderstanding of his patient's symptoms by telling him to pull himself together, to think of his father and mother

or his wife and children, to take a sea voyage, to interest himself in 'wireless'. After much argument 'about it and about' the patient may be fobbed off with a prescription for 'mixed glands', radio-therapy, or massage. A pail of water thrown over the sufferer would be as effective. Few escape with the extraction of their teeth in attention to the insults hurled at them through ignorance enforced by the unresolved conflicts of the physician himself!

An individual obsessed with a feeling of guilt usually tries to deal with it by resorting to a number of defence mechanisms. Among such mechanisms we may find repression, over-compensation, projection, identification and self-punishment. The commonest form of over-compensation for the ordinary feeling of guilt is moral priggishness, e.g., the 'goody-goody' child. The 'moral prig' is generally happiest when looking out for other people's misdemeanours. The 'nosey Parker', who spends his time in searching the public parks for acts of indecency, is an example of this type of psychological mechanism. Similarly, 'purity leagues', albeit with the best intentions, do a great deal of harm by exaggerating the importance of sexual guilt. For example, the well-meaning pamphlets circulated to adolescents about masturbation are often only examples of the mechanism of projection. Their effect is generally to exaggerate their reader's feelings of fear and guilt and by so doing to do more harm than good. As Dr. Graham Howe observes in his book to which reference has already been made, such pamphlets do more harm than the minor offences which they seek to eradicate. The belief that seminal fluid emanates from the spinal cord is enormously widespread, even among people who lay claim to be educated. Quite recently a patient of mine, holding an important position in a large mercantile firm, told me he had given up sexual relations with his wife so as not to weaken his 'nerves'. I had great difficulty in persuading him that this self-imposed abstinence, so far from doing him any good, was doing him harm, quite apart from the effect it was having on his wife. The frequency with which patients tend to believe masturbation to be the cause of their illness is well known to most doctors. This tendency is not lessened by the fact that they have read that such is the case in 'purity' pamphlets or have been told so by sexually-jealous parents or ignorant school masters.

Perhaps the most terrible of all the defence mechanisms against the feeling of guilt is self-castration. Truly, this does not occur in actuality, except in severe psychoses, but it is by no means uncommon in a symbolical form. The fear of personal injury of any sort is tolerably widespread among boys and youths of

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OBSERVATIONS ON THE THICKNESS OF THE FRONTAL AND PARIETAL BONES

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Two cases of fracture of the skull were transferred to the writer's wards last year, both having been suspected to be cases of cerebro-spinal meningitis.

Case 1.—On the 17th April, 1933, S. A., a Moham-medan male, aged 32, was admitted to the surgical wards for suspected internal injury, but was later transferred, as it was considered to be a purely medical case. Patient at the time was semi-conscious, restless, vomiting often, could not speak at all. Pulse—78, respiration—18 per minute, pupils normal, rigidity of the neck—doubtful, Kernig's sign + on the right side only, Brudzinski's sign—absent, knee jerks + on the right side, Babinski's sign—absent, red blood corpuscles—4,600,000, white blood corpuscles—32,000, polymorphonuclears—92 per cent, lymphocytes—6 per cent, large mononuclears—2 per cent, lungs—normal, lumbar puncture fluid contained neither pus cells nor diplococci.

19-4-33.—Pupils slightly dilated; other conditions same.

20-4-33.—He appeared more stupid and dull with Kernig's sign ++ on the right side; general condition the same as before.

21-4-33.—Patient unconscious with laboured breathing, pulse—90, and respiration—26 per minute.

22-4-33.—He was comatose with pulse—115, respiration—32 per minute. The second lumbar puncture fluid

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neurotic temperament. The analysis of such a fear invariably brings to light that the injury that is dreaded is castration as a punishment for sexual delinquency. Dr. Graham Howe very rightly observes, it is impossible to estimate the price that we pay for the continued existence of our unconscious guilt feelings. As a single source of sorrow it is probably by far the greatest in the world for there is nothing which so intimately touches the lives and happiness of every individual as matters pertaining to sex. We may feel comparatively safe if we attribute to the sexual factor most of the commonest examples of mental ill health besides much that passes for physical ill health. In addition to this we must reckon with much unhappiness that is never confided to the family doctor or to the family lawyer. It is borne in silence. How, it may be asked, may all this misery, or even a portion of it, be prevented? To those who profess an interest in the health of the human mind it must be evident that at least one thing must be done and the sooner the better, namely, to examine ruthlessly the taboos which militate against our happiness and our social efficiency. In short, matters of behaviour should be judged, not in relation to some inherited dogma, but in relation to its probable result. Conduct is good if on the whole it produces good results, and bad if it produces bad results.

contained no pus cells and no cocci. The patient died at 7 p.m.

The post-mortem examination revealed a fissured fracture of the left parietal bone with extra-dural hæmorrhage at the site and softening of the brain matter on the under surface of the right frontal lobe (*contre-coup* injury) with a partially organized clot of blood. The thickness of the parietal bone at the antero-inferior angle was one-tenth of an inch and at the postero-superior angle one-sixth of an inch. It transpired that the man was hit in the stomach with fists and then chased, when he fell down on the stone pavement of the street.

The point at issue was the thickness of the skull and whether fracture of the parietal was possible from a simple fall in the street or from shoe beating on the head.

Case 2.—On the 21st June, 1933, Y. J., a Mohammedan male, aged 30, was admitted to the surgical wards for head injury, but was transferred to my wards on the 24th June, being thought to be a medical case. Patient at the time of transfer was found semi-comatose, did not respond to questions, Kernig's sign +,

serious injuries, nor the blows inflicted repeatedly showing deliberate intention to cause death. In such cases, the accused should not be charged for culpable homicide amounting to murder (I. P. C. section 300). Really the charge should come as simple hurt (section 337) or grievous hurt (section 338) or rash and negligent act (section 304A) or grievous hurt not amounting to voluntarily causing hurt (sections 321 and 322).

I took measurements, in the medico-legal post-mortem examinations of Indians, of the thickness of the frontal bone in the midline at a point 2 inches behind the glabella, in 31 cases, and of the parietal bone at the antero-inferior angle, in 40 cases, and postero-superior angle, in 38 cases, to find out the common average thickness.

The following tables show the different thicknesses, in inches, and their frequency :

TABLE I

All ages from 5 to 60 years

	1"	1 1/8"	1 1/4"	1 1/2"	1 3/4"	2"	2 1/8"	2 1/4"	2 1/2"	2 3/4"	3"	3 1/4"	3 1/2"	Total cases
Frontal .. ..	..	..	..	..	7	3	9	..	7	1	3	1	..	31
Parietal, antero-inferior	3	1	1	1	20	6	5	2	1	..	..	..	..	40
Parietal, postero-superior	..	1	..	..	..	2	9	..	18	..	5	3	..	38

Brudzinski's sign doubtful, well-marked general rigidity of the body, pupils—dilated, pulse—88 and respiration—24 per minute. Lumbar puncture fluid contained neither pus cells nor cocci.

Blood—red blood corpuscles—4,000,000, white blood corpuscles—12,000, polymorphonuclears—60 per cent, lymphocytes—30 per cent, large mononuclears—8 per cent and eosinophiles—2 per cent. On finding the contra-indications for cerebrospinal meningitis, I decided to have an x-ray examination. In the meantime the patient showed signs of improvement.

On the 29th he became conscious though occasionally violent. He could not remember how he came to hospital but spoke a few sensible and intelligent words. He sat up and was able to walk a few paces with difficulty. By the 3rd July, he remembered how he fell down while alighting from a running train. He was also able to give his name and address. His gait was more spastic on the right side. From this time onwards he made a rapid recovery and complained of nothing beyond giddiness and slight weakness on the right side of the body. He was discharged cured on the 28th July. The x-ray examination showed a tri-radiate fracture (fissured) of the left parietal bone.

A good many people in this country are in the habit of carrying big *lathis* for protection. In direct violence in assaults by *lathis*, the frontal and the parietal bones are most vulnerable to injury, but if the bones are thinner than normal, a slight amount of violence, for instance with fists and shoes, inflicted inadvertently, might cause fracture of the skull terminating in death. The intention might not be to cause death, nor the weapon used of such a nature as to cause

TABLE II

	Frontal	Parietal, antero-inferior	Parietal, postero-superior
	Per cent	Per cent	Per cent
1/8" upwards ..	100	..	..
1/8" to 1/4" ..	84	85	..
3/16" upwards ..	80	..	..
1/8" only ..	20	50	..
1/6" upwards ..	..	..	97.5
1/4" only ..	..	..	45
For ages above 20 years	..	6.5	..
1/16" to 1/10" ..	..	..	..

TABLE III

	Frontal	Parietal, antero-inferior	Parietal, postero-superior
	1"	1 1/8"	1 1/4"
	Per cent	Per cent	Per cent
Males ..	39	52	43.5
Females ..	29	50	50

(Continued at foot of opposite page)

HOOKWORM INFECTION IN THE PUNJAB*

SURVEY OF A RURAL AREA IN AMBALA DISTRICT

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THE area considered in this paper consists of two villages—Bharatgarh and Bara Pind—in Rupar tehsil of Ambala district. This territory, usually described as submontane, is situated in the vicinity of the Siwalik range and includes a considerable portion of hilly country. The villages are situated on a range of low foot-hills in the close vicinity of the Sutlej river. These foot-hills are very irregular and are traversed by footpaths which lead from the villages situated at the top into the valley below. The soil is a sandy loam and therefore, given the requisite humidity, eminently suitable for the development of hookworm larvæ. The annual rainfall of the area based on an average of the last ten years is about 33 inches, of which over 20 inches are recorded during the months of July and August, when hookworm infection is most likely to take place.

The investigation was instituted under instructions from the Director of Public Health, Punjab, at the request of the District Medical Officer of Health, Ambala, who suspected the prevalence of hookworm infection in this area. One of us (J. R. C.) visited the area in the month of March 1934 and collected 150 stools from the two villages. The method advocated by Maplestone (1929) for collecting and preserving stools was used, namely, a paper capsule with a capacity of 4 c.cm. was filled with each specimen of stool and placed in a

* This is an extension of the work already reported on at length by Dr. R. B. Lal in the publication of the British Medical Association, Lucknow.

(Continued from previous page)

From the above it is evident that in Indians above the age of 20 years, both males and females, it is unusual to find the thickness of the parietal bone at the antero-inferior angle below one-eighth of an inch.

[*Note.*—Dr. Sen's observations on the thickness of the frontal and parietal bones in Indians form an important contribution to forensic medicine in this country; we are not however in entire agreement with his conclusions. In the first place, thickness is not the only quality of the cranial bones on which the cranial contents depend for their protection; there is the question of density.

Again, even if Indians have easily-fractured skulls, presumably they have always had them. The charge should depend on other circumstances in the case, and we do not think that unless the skull is exceptionally thin and brittle that this question of thickness should be taken into account.—Editor, I.M.G.]

bottle containing 20 c.cm. of 2 per cent anti-formin. This strength of antiformin according to Maplestone (1929) is very effective for the preservation of hookworm ova up to 18 days without any appreciable loss due to degeneration, and also for the prevention of larval development. The bottles were already fitted into portable boxes each of which was capable of accommodating 100 bottles. At the same time particulars of each person whose stool was collected, namely, name, age, sex, occupation, religion, etc., were obtained and entered in a special form. The whole material was transported to the laboratory of the Punjab Epidemiological Bureau, Lahore, for examination. Similarly 145 persons, of all ages and both sexes, taken at random, were subjected to a clinical examination for the purpose of detecting any manifestations of hookworm disease. Observations were also made to estimate the percentage of hæmoglobin by means of Tallqvist's scale.

The results obtained are of considerable interest, in view of the fact that very little accurate information about the prevalence of hookworm infection in this part of the Punjab is available with the exception of the solitary observation made by Chandler (1927), who examined the stools of 97 persons in a village near Ambala.

The technique employed

All specimens of stools were examined by Lane's direct centrifugal flotation method with the modification that the cover-slips, instead of being placed on plasticine cones, were placed directly on a microscope slide and examined in the usual manner under the microscope. We found this modification of Lane's technique much more expeditious and convenient to work with than the original technique. In addition 100 specimens of stools were subjected to a modified Stoll's method of counting (1923). The 18 c.cm. of faecal emulsion containing 3 grammes* of the faeces remaining in the collecting bottle, after 6 c.cm. had been withdrawn for diagnosis by Lane's (1922-23) method, were made up to 45 c.cm. by the addition of 27 c.cm. of N/10 sodium hydroxide and thoroughly shaken up with glass beads in a mechanical shaker. Of this emulsion 0.1 c.cm. was measured with a bacteriological pipette and placed on a microscope slide, covered with a $\frac{7}{8}$ inch square cover-slip and the number of eggs counted. This number multiplied by 150 gave us the number of eggs per gramme of faeces.

The incidence and intensity of hookworm infection

Of the stools of 150 persons examined 123 were found positive for hookworm ova, showing

* One c.cm. of faeces very closely corresponds to one gramme.

that 82.0 per cent of the population were infected with hookworm. Of the 100 specimens counted by the modified Stoll's method the average count per gramme of faeces was found to be 422.7. The infection index, which is a measure both of the incidence as well as the intensity of infection, was also calculated according to the formula suggested by Chandler (1926)—

$$\sqrt{\frac{\text{egg per gramme} \times (\text{per cent})^2}{100}}$$

The index was found to be 136.2 for the area under investigation. A comparison of our figures with those of Chandler (1927) in Ambala district is shown in table I :

TABLE I

Hookworm infection in Ambala district

	Chandler's figures	Our figures
Number of persons examined	97	150
Incidence of infection ..	51.5%	82.0%
Average egg count per gramme of faeces.	130	422.7
Infection index ..	67	136.2

It will be noticed that our figures indicate a much more serious state of affairs in Bharatgarh as compared with Chandler's in a village of Ambala district. In Bharatgarh not only is the incidence of hookworm infection higher but the intensity of infection, as indicated by the average egg count per gramme of faeces, is more than three times that of Chandler's in Ambala. Likewise our index of infection (136.2) is more than double that of Chandler's which is 67.

This is further corroborated by the state of affairs revealed by a clinical examination of a certain number of the inhabitants of the area.

Clinical manifestations of hookworm infections

A sample of the population consisting of 145 persons taken at random was examined clinically. Of this number only 20 or 13.8 per cent were regarded as free from symptoms, the rest had some symptom or other indicating hookworm infection. The group of 145 persons was divided into three classes on the basis of their clinical condition as shown in table II. Of this number 119 were found to be harbouring hookworm. Fifteen or 12.7 per cent of the latter had no apparent clinical symptoms; 47 or 39.5 per cent were regarded as showing symptoms of moderate severity, whilst the rest, 57 or 47.8 per cent, exhibited severe symptoms. Table II serves to illustrate the incidence and intensity of hookworm infection in the three clinical groups, and also shows the average hæmoglobin value in each group. It will be noticed that the severity of clinical symptoms increases *pari passu* with the intensity of hookworm infection. The average percentage of hæmoglobin, on the other hand, decreases with the intensity of infection and the severity of clinical symptoms. An important association is thus apparently established between the intensity of infection, the average hæmoglobin value and the clinical effects of the disease. Another point of interest which emerges from a study of this table is the fact that, on an average, an egg count of 192.5 is not of any clinical significance, whereas an egg count of 586.1 is associated with severe symptoms, namely, marked anæmia with indications of cardiac involvement—palpitation and breathlessness on slight exertion.

TABLE II

Clinical effects of hookworm infection

	Number of persons examined	Number found positive for hookworm ova	Percentage infected with hookworm	Average egg count per gramme of faeces per person	Infection index	Average percentage of hæmoglobin
Class I Normal persons with no clinical symptoms.	20	15	75	192.5	89.3	57.7
Class II Persons with signs and symptoms of moderate severity, usually anæmia with or without digestive disturbances.	57	47	82.4	356.5	121.4	56.9
Class III Severe cases with marked anæmia, breathlessness and palpitation.	68	57	83.8	586.1	171.0	52.1

The incidence and intensity of infection according to occupations is shown in table III :

TABLE III

Incidence and intensity of hookworm infection according to occupations

	Number of persons examined	Number found positive	Percentage infected	Average egg count per gramme of faeces per person
Cultivators ..	49	46	93.8	484.1
Labourers ..	23	19	82.6	595.8
Artisans ..	45	33	73.3	396.4
Shopkeepers ..	11	7	63.6	117.8

It will be seen that the incidence of infection is highest amongst the cultivators who work in the fields, and lowest amongst the shopkeepers. The labourers, who take part in the field work at certain seasons of the year when they are hired by the cultivators, come next to cultivators, the artisans occupying an intermediate position between the shopkeepers and the labourers. As regards the intensity of infection indicated by the average egg count, the same order is maintained as in the case of incidence, except that the cultivators show a lower average count than the labourers. The data available, however, are too small to enable us to come to any definite conclusions.

The incidence of hookworm infection according to age groups is shown in table IV :

TABLE IV

Incidence of hookworm infection according to age groups

Age group year	Number of persons examined	Number found positive for hookworm ova	Percentage infected
1-5 ..	6	5	83.4
6-10 ..	13	11	84.6
11-40 ..	114	96	84.2
41 and over ..	17	11	64.7
TOTAL ..	150	123	82.0

The number of persons examined in each age group with the exception of the age group 11 to 40 is too small. It may, however, be permissible to conclude, tentatively, that the incidence of infection tends to remain high up to 40 years, and thereafter it tends to diminish, probably on account of decrease in the amount of work carried out in the fields.

The distribution of hookworm infection according to religion and sex is shown in table V :

TABLE V

Hookworm infection according to religion and sex

Religion and sex	Number examined	Number positive for hookworm ova	Percentage infected	Number counted	Average egg count per gramme of faeces per person
<i>Hindus</i> —					
Male ..	117	96	82	76	471.7
Female ..	20	14	70	12	289.5
<i>Muslims</i> —					
Male ..	13	13	100	12	383.3
Female ..	..	..	..	..	..

The figures are not, strictly speaking, comparable as the number of Muslims examined is very inadequate, namely 13 only, and this does not include any females.

However, the intensity of infection appears to be greater in the Hindu males as compared with Muslim males, as the average egg count per gramme of faeces is 471.7 in the former as compared with a count of 383.3 amongst the latter. This is probably due to the fact that the Hindus include a considerable proportion of low-caste 'Mahashas', or untouchables, who are very insanitary in their habits.

As regards the distribution of infection in Hindu males and females, the latter show an incidence rate of 70 per cent as compared with 82 per cent in the former. The intensity, as shown by the average egg count per gramme of faeces per person, is also considerably higher in the males with a count of 471.7 as compared with a count of 289.5 in the females.

Defaecation habits

With the exception of the few houses belonging to comparatively well-to-do persons, the rest of the houses in the villages are not provided with any latrines. The inhabitants visit the immediate neighbourhood of the villages for purposes of defaecation, the most favourite sites being the numerous footpaths which lead from the top of the hill, where the villages are situated, into the valley below. It seems highly probable that these sites for defaecation, which are subject to intense and concentrated pollution on account of their limited area, serve as much more dangerous and repeated sources of infection than the corresponding sites in the plains where the area is much larger and the sites available for defaecation more scattered. The fields in the valley are often frequented by the males. The females usually do not go far from the houses, while the children freely

and promiscuously use the house yards, the streets, and the old deserted and neglected houses. Favourable conditions of humidity are provided for larval development by the local rainfall during the rainy season, while during the rest of the year the water which is commonly used for ablutions after defæcation serves to keep the defæcation sites sufficiently damp.

No foot-gear is used by the children and the females, the latter using a variety of sandal only on special occasions. Some of the male adults wear Indian shoes which resemble slippers and which are taken off during work in the fields.

Summary

1. A hookworm survey of two villages in Rupar tehsil of Ambala district is described.

2. The collection and preservation of stools in the field was carried out by Maplestone's method.

3. Stools were examined by Lane's direct centrifugal flotation method and the counting of hookworm ova was done by a modified Stoll's method.

4. One hundred and fifty persons were examined giving an incidence rate of 82 per cent, an average egg count per gramme of faeces per person of 422.7 and an infection index of 136.2.

5. One hundred and forty-five persons were subjected to a clinical examination. Of these 119 were found passing hookworm ova in their stools, 12.7 per cent had no symptoms, 39.5 per cent showed symptoms of moderate severity and 47.8 per cent had severe symptoms. There was a direct relationship between the severity of clinical symptoms and the intensity of infection as shown by the average egg count per gramme of faeces. There was an inverse relationship between the severity of clinical symptoms and the intensity of infection on the one hand and the average hæmoglobin value on the other.

6. The incidence of infection was highest amongst the cultivators and lowest in the shopkeepers, the labourers and artisans occupying an intermediate position.

7. The incidence of infection showed a tendency to remain high up to 40 years of age. Thereafter it tended to diminish.

8. The incidence and intensity of infection was greater amongst males than amongst females.

9. The houses in general are not provided with latrines and the chief defæcation sites are the footpaths leading from the village on the crest of the hill into the valley below where the fields are situated.

10. The women and children practically go barefooted. Some of the adult males wear

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A STUDY OF TRACHOMA IN BALUCHISTAN

By P. SHANNON

CAPTAIN, I.M.S.

I. Definition of trachoma

At present in different standard textbooks of ophthalmology the terminology varies. Fuchs (1924) refers to typical trachoma granules or granulations, explaining that these should not be confused with granulation tissue as their structure is entirely different. Elliot (1920) also uses the former term while Swanzy (1925) designates them either trachoma bodies or granulations, and Cuenod and Nataf (1930) use the term *granular follicles*.

These multiple terms tend to lead to much clinical confusion, for, depending on the stage of the disease, the appearance of the conjunctiva may present a very varied picture, apart from the trachoma bodies or granules giving the typical frog-spawn or sago-grain appearance.

Where follicles have ruptured and an attempt at healing is taking place, an appearance remarkably like true granulation tissue is given by the combination of papillæ, scar tissue and ulcerated follicles.

This process, however, is much later than that producing the typical sago-grain appearance, so the inexperienced can form no accurate idea of the course of the disease or determine what form of treatment should be adopted.

Strother Smith's (1927) advice 'Do not diagnose a case as trachoma simply because he has granular lids' is valuable, for in India, as in other eastern countries, there is a vast amount of simple chronic conjunctivitis due to the local irritants peculiar to the East—dust, smoke, sand, etc.—together with chronic follicular conjunctivitis and trachoma, but the term 'granular lids' is applied to all of these conditions whether accompanied by the formation of granules or not, with the result that not only are vast

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Indian shoes, but remove them during work in the fields.

REFERENCES

Chandler, A. C. (1926). The Prevalence and Epidemiology of Hookworm and other Helminthic Infections in India. Part I. *Indian Journ. Med. Res.*, Vol. XIV, p. 185.

Chandler, A. C. (1927). The Prevalence and Epidemiology of Hookworm and other Helminthic Infections in India. Part IX. *Ibid.*, Vol. XIV, p. 955.

Lane, C. (1922-23). The Mass Diagnosis of Ankylostome Infestation. Part I. *Trans. Roy. Soc. Trop. Med. and Hyg.*, Vol. XVI, p. 274.

Maplestone, P. A. (1929). A Simple Method of Preserving Faeces containing Hookworm Eggs. *Indian Journ. Med. Res.*, Vol. XVI, p. 675.

Stoll, N. R. (1923). Investigations on the Control of Hookworm Disease. XV. An Effective Method of Counting Hookworm Eggs in Faeces. *Amer. Journ. Hyg.*, Vol. III, p. 59.

numbers of innocent conjunctivitis cases diagnosed as, and wrongly treated for, trachoma, but proper advance in the clinical knowledge of the trachomatous process is greatly impeded.

Since a study of the histopathology of the disease shows that the compound follicle, similar in structure to the lymphoid follicles elsewhere, is the essential lesion in the disease process, I consider that a greater standardization of the terminology according to the two main clinical features of the disease—namely, the follicles and the papillæ—would result in an easier understanding of the character and course of the disease, and, coupled with the adoption of MacCallan's classification, would result in a much more accurate clinical knowledge of what is or is not trachoma.

MacCallan (1931) has classified the disease as follows:—

Stage I or Tr. I. Early stage of 'pin's-head' follicles.

Stage II or Tr. II. Subdivided into—

Tr. II(a) where follicles are large and gelatinous,

Tr. II(b) (i) papillary enlargement as well as follicles,

Tr. II(b) (ii) follicles with the added complication of spring catarrh,

Tr. II(c) trachoma complicated by gonococcal conjunctivitis.

Stage III or Tr. III. Where cicatrization has commenced, often non-contagious.

Stage IV or Tr. IV. Where cicatrization of the conjunctiva is complete. This stage is non-contagious.

The difficulty in separating trachoma from allied conditions, especially those characterized by innocent follicular formations, is shown well by a study of the conflicting views enunciated by present-day workers. Nicolle (1927), for instance, does not regard trachoma as a specific disease of a peculiar type but as the most widely disseminated, most serious and best defined clinically of a very numerous group of diseases—the granular inflammations of the conjunctiva—while Aubaret (1928) regards it as a specific entity. This difficulty is recognized by the Egyptian authorities, and in India Strother-Smith (1927), Coppinger (1927), Wright (1928) and others record that nine-tenths of cases so diagnosed and sent to them for treatment are not trachoma; while the first-named author in quoting his early successes with mercury cyanide subconjunctivally, in 1912 in the treatment of trachoma, has now come to regard the cases showing the marked improvement of which he wrote as cases of simple folliculitis.

Clinically simple folliculitis and trachoma may be differentiated thus:—

<i>Early trachoma</i>	<i>Simple follicular conjunctivitis</i>
1. Follicles embedded in the conjunctiva.	1. Follicles sit on the conjunctiva.
2. Follicles always on an inflamed surface.	2. Follicles on a normal or slightly inflamed surface.
3. Small areas of pinpoint petechial hæmorrhages around follicles.	3. No hæmorrhages visible.
4. Follicles more marked on upper lid than lower.	4. Follicles more marked on lower lid than upper.
5. Follicles definitely encroaching on to tarsal plates of lids—site of election upper margin of tarsal plate and angles.	5. Follicles confined to fornices, lower and upper, showing no tendency to invade the tarsal area of the conjunctiva.

The other points of difference quoted in the standard works are,

(a) ready improvement of follicular conjunctivitis with treatment,

(b) more common occurrence of the innocent condition in children,

(c) lack of lid scarring and corneal involvement, and

(d) lack of spontaneous rupture of follicles on double eversion of the lid,

and are of no value in the diagnosis of the class of case which presents real difficulty in India, namely, the doubtful early (Tr. I) case *versus* the chronic folliculitis case.

For a clear understanding of trachoma as I have seen it in India, both in the North West Frontier Province and Baluchistan, MacCallan's classification is the most practical basis for working on. In a few respects, such as the absence of (a) complicating gonorrhœal ophthalmia and (b) spring catarrh, the disease differs from the Egyptian, (a) is no more common than in the United Kingdom, and (b) is only very occasionally found with trachoma.

I would classify it thus:—

1. *Early trachoma* (Tr. I and Tr. II, MacCallan), confined to the conjunctivæ of the lids as papillæ and follicles situated in and just under the conjunctiva.

2. *Medium trachoma* (Tr. III), consisting of chronic tarsitis and chronic lymphatic infiltration of the conjunctiva together with attempted healing.

3. *Late trachoma* (Tr. IV), completely healed trachoma.

In 'early trachoma' (Tr. I) there are few papillæ and follicles, the former chiefly along the upper border of the upper tarsal plate; the latter, especially in the upper fornix, encroaching on the tarsal conjunctiva centrally and at the angles, but definitely embedded in the conjunctiva and surrounded by little engorged areas or minute hæmorrhages.

In Tr. II the above changes are much more in evidence, but the whole process is still superficial as shown by no true thickening of the

tarsus itself, any thickening being of an oedematous nature.

In 'medium trachoma' (Tr. III) the chief criterion is involvement of the tarsal plate itself, which is more or less grossly thickened and can be so demonstrated clinically by the difficulty experienced in double everting the upper lid with the hook. It is in this stage, after the extrusion of the follicles on the surface,—ulceration—that in between the cicatrices there is the appearance akin to granulation tissue as opposed to the typical sago-grain follicles. The conjunctiva in this stage also often presents the appearance of felt over the whole of the conjunctival surface of the upper tarsus with no evidence of papillæ or follicles, the fornix by now being almost obliterated and no definite cicatricial bands being seen. This stage more or less merges into the next.

In 'late trachoma' (Tr. IV) the tarsal conjunctiva is completely cicatrized with one or two bands of scar tissue such as Arlt's (1881) sulcus. The tarsal plate in this stage is thin again and, if evenly cicatrized, it may be difficult to diagnose the case as healed trachoma. If the cicatrization has occurred unevenly the effects of this, such as entropion, may be visible.

These are the main landmarks in the course of the disease, though sometimes it may be found difficult to separate them in practice, as the change from one to the other is gradual. Of two of the main features of the disease, namely, ptosis and pannus, something further must be said.

Ptosis.—Strother Smith, Bishop Harman (1931) and Galal Aboul Seoud (1927) mention drooping eyelids, trachomatous ptosis as it is called, as the most noticeable point about trachoma which differentiates it from any other conjunctivitis, but I have found that there may be no ptosis in the early cases, and not until stage III is the condition well marked. The only early cases showing marked ptosis have in my experience been those complicated by secondary acute conjunctivitis, when the ptosis appears to be oedematous and inflammatory in origin. The typical ptosis met with in Tr. III is in my opinion the result of the chronic tarsitis which is the essential of this stage and which has caused chronic hypertrophy and thickening with increased weight of the tarsal plate.

In this connection Herbert (1907) has demonstrated 'the sinuous lid border' as an almost exclusive sign of trachoma, his description of the condition being 'the inner portion of the lid margin arches upwards in a normal manner, but the outer half presents a curve with its convexity downwards. It (the distortion) is nearly always bilateral'. He found the condition always associated with marked ptosis and confined to rather severe cases of the disease, but considered that the distortion was not due to cicatricial contraction for he found it was well marked before contraction had

taken place. His explanation, as Elliot (1920) remarks, of its probable cause being blepharospasm remoulding a softened tarsus, is difficult to follow. I consider it is much more probable that this condition is the result of incomplete cicatrization of the hypertrophied and thickened tarsus of Tr. III in severe cases, which is not completely converted into the smooth contracted condition found characteristically in Tr. IV. Instead, the centre of the tarsus has undergone this change, becoming thinned, while the angles remaining thick give this pathognomonic appearance to the lid. This explains Herbert's finding that it is confined to severe cases of the disease in which also the ptosis is most marked, for it is well recognized by MacCallan and others that many cases of healed trachoma show no ptosis and have been so mild that the only evidence of the disease is scanty, horizontal scarring of the surface of the membrane; in others not even this diagnostic sign remains.

Pannus.—The signs originally discovered by Herbert (1904) in this respect, which have since been described under different names by various observers (Bonnet, 1927 and 1928; Millet, 1924) and are now regarded as a true extension of the trachomatous process to the cornea, resulting in follicular ulceration on that surface (Cuenod and Nataf, 1931; Morax, 1929), are certain evidence of active trachoma, but in India large numbers of mild trachoma cases never show corneal involvement and the only evidence in others is a faint haziness of the upper region of the cornea resembling faint arcus senilis but without its sharply demarcated edge. So the corneal signs are of diagnostic value only in active cases of the disease.

II. Details of present work

The work on which my conclusions are based has been carried out in order to appreciate trachoma as it occurs in India.

Quetta, where the examinations were carried out, is the largest military station in British India and has a total population of 60,228 (1931 census—town and suburbs 34,892, cantonments 25,336), with a garrison of over 12,000 (British 3,000, Indian 9,000 approximately). It is situated at a height of between 5,000 to 6,000 feet above sea level. Unlike the greater part of India, it has no monsoon with its sudden break in the hot spell, but a gradual change throughout the year from winter cold with freezing temperatures, rain and snow from December to March, a European spring gradually increasing to summer heat of June, July and August with the temperature reaching above 100°F. (the average weekly temperature during these months is 80 to 85°F.), cooled only for short periods by a few hours' rain.

The rainfall is only four to five inches a year and the humidity is consequently low (weekly relative humidity during the hot months is 50 to 70 per cent). The soil is sandy throughout

the province, Quetta itself being situated on a large sandy plain surrounded by mountains and barren rocks absorbing heat and reflecting light, so that ground glare is particularly troublesome.

In the winter, cold, strong, biting winds from Afghanistan are prevalent, while for four months of the year during the hot weather dust storms occur often two and three times a week. These dust storms sweep throughout the town and district, often continuing throughout the whole day. The dust rises in huge whirlwinds of so-called 'dust devils' reaching 300 to 500 feet high, penetrating everywhere—dwelling houses, work places, parade grounds—collecting in all eyes, and depositing therein dust containing dried infective material from conjunctivitis cases and from the faeces and filth that are deposited anywhere throughout the countryside.

As specialist in ophthalmology for Baluchistan district I have had an opportunity of studying the eye diseases affecting the military population stationed in the province and noting the conditions chiefly responsible for temporary disablement, permanent unfitness for service and permanent damage to sight. It was early found that the majority of Indian troops reporting sick with eye complaints were suffering from external eye diseases—diseases of the lids, conjunctiva and cornea—the numbers in this category being out of all proportion to those amongst the British troops who lead the same type of army life under the same climatic conditions.

Incidence of diseases of lids, conjunctiva and cornea of British and Indian troops in 1931-1932

	1931		1932	
	Number	Per mille	Number	Per mille
British ..	25	0.083	19	0.063
Indian ..	283	0.314	239	0.265

Further it was found that those cases complicated by trachoma proved more serious and were much more slow in responding to treatment than similar cases in British troops. Further, most trachoma cases reporting sick on account of eye symptoms were found almost invariably to be suffering from complicating secondary acute or subacute conjunctivitis. Cases with uncomplicated early (Tr. I and Tr. II) trachoma rarely reported sick on this account. So to study the incidence of the disease throughout the Indian garrison and determine the factors which might influence its occurrence, spread and course, examinations were made of various classes of Indian troops and, for comparison with these, examinations of civilian recruits and school children. The effects of

different forms of treatment were also investigated.

Examinations

An examination of men of the Indian Hospital Corps was carried out in September 1931 and in September 1932—

- (a) to determine the proportion of the uncomplicated disease in the unit,
- (b) to observe and classify the different forms and stages of the disease, and
- (c) to record the findings and re-examine the unit after one year.

The results of this examination show that the unit trachoma incidence was 43 per cent in 1931 and 27 per cent in 1932.

The re-examination after one year was with the intention of forming a check on the original observations, and of noting the changes occurring within this period.

Unfortunately, owing to the retrenchment of the Indian Army since 1931, of the 383 men examined that year only 61 were present for re-examination in September 1932, the whole Gurkha section of the unit having been disbanded and the total unit reduced by two-thirds, so that the figures have not proved as valuable as they otherwise might. There were only minor changes in the classification in 16 cases; ten of the doubtful cases were later regarded as free of trachoma; no case previously regarded as free of trachoma was considered to have shown signs at the second examination; only one case of Tr. III was considered on the second examination to be free of trachoma (this was a mild case which had undergone treatment after the first examination); and no case of early (Tr. I and Tr. II) had become late (Tr. III and Tr. IV).

Bearing in mind the above results the fall in trachoma incidence in the unit from 43 per cent to 27 per cent must be regarded as due to the disbandment of the most heavily trachoma-infected men of the unit.

An examination of a Punjab regiment was carried out. The results show that the unit trachoma percentage is 30.0 while the only marked community variation is found among Sikhs in whom the incidence is twice as great as among others.

Punjabi and North West Frontier Mussulmans in a cavalry unit show an incidence (62 per cent) twice as great as that among the similar classes of infantry.

The necessity for the segregation of the infected into trachomatous units as was carried out during the great war by Lister (1923) and in Indo-China since, and emphasized by Talbot (1929) and others, prompted the examination of a mixed unit (Royal Bombay Sappers and Miners). In this unit two-thirds of the men are Punjabis (Mussulmans and Sikhs) and one-third Mahrattas (natives of Bombay, the Deccan

The results are summarized in the table below :—

protoplasm taking a medium or light blue stain. It was only in these isolated epithelial cells that

Analysis of treatment results

Treatment used	Total cases	Clinical cure		Rapid conversion to Tr. IV		Disease arrested		Gradual improvement to Tr. IV		Doubtful result		No effect	
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Silver nitrate, 15 per cent	(b) 5	..	..	3	60	..	..	1	20	..	..	1	20
Berberine or sod. morrh.	(b) 9	..	..	..	..	..	..	..	..	..	..	9	100
Scraping	(a) 10	6	60	..	..	..	..	..	..	..	..	4	40
	(b) 3	1	33	..	..	..	..	1	33	..	..	1	33
Ultra-violet rays ..	(a) 8	2	25	..	..	..	..	2	25	1	12	3	37
	(b) 4	..	..	..	..	..	..	2	50	..	..	2	50
Sodium chloride ..	(a) 8	8	100	..	..	..	..	..	..	..	..	..	..
	(b) 14	2	14	11	78	..	..	..	..	..	..	1	8
Oleum chaulmoogra ..	(a) 1	..	..	..	..	..	..	1	100	..	..	..	..
	(b) 3	..	..	1	25	..	..	2	50	..	..	..	..
Tarsectomy ..	(b) 6	..	..	..	..	4	67	1	16	..	..	1	16
TOTAL ..	(a) 27	16	57½	..	..	..	..	3	11	1	3½	7	25
	(b) 44	3	6	15	34	4	8	7	15	..	..	15	34

(a) = Tr. I and Tr. II cases.

(b) = Tr. III and Tr. IV cases.

It will be noted that the diagnosis of these trachoma cases is based on clinical findings for none of the available laboratory or serological tests were considered more reliable.

Laboratory findings

Scrapings from 10 cases of trachoma grown on ordinary nutrient agar, blood agar and serum agar did not produce very satisfactory results: half the tubes were sterile and in the remainder *Bacillus xerosis*, *Staphylococcus albus* (in one case) and *Staphylococcus aureus* (in four cases) were grown. Very similar results were obtained from 46 cases of acute conjunctival infections.

Conjunctival scrapings (stained by Giemsa's method and examined for cellular contents) showed :—

1. Predominance of large lymphocytes, with large granular nuclei often showing karyokinetic changes.

2. Small lymphocytes and plasma cells considerably less in number than the large variety.

3. Occasional irregular granular cells with deeply-staining intracellular bodies corresponding in appearance to the cells of Leber. These were not prominent and were not very typical in appearance.

4. Epithelial cells in quantity, oftenest in collections together, but here and there as isolated cells with large nuclei and surrounding

faint pink granular bodies, corresponding to those described by Prowazek and Halberstaedter (1907), were seen.

Though such findings were confirmatory of trachoma the clinical evidence was found to be sufficiently reliable. Twelve sections from cases in which tarsectomy was performed showed the classical changes due to the disease. Notable features in these were :—

- (1) In most of the sections the epithelium was missing or only remaining in islands over the surface.
- (2) Typical follicles were present in all. Though in one case of late Tr. III there was only one shrunken degenerated follicle which appeared strangled by the overgrowth of connective tissue.
- (3) The follicle centre in most cases had degenerated into a homogeneous mass with large lymphocytes in it. The outer ring of the follicle consisted of small lymphocytes and plasma cells which also infiltrated the surrounding tissue and especially the layers immediately adjacent to the epithelium itself.
- (4) The formation of new embryonic blood vessels in the vicinity of the follicles was a well-marked feature in all the medium Tr. III cases, with small-celled infiltration in the new vessel walls.

- (5) In the late Tr. III cases, referred to above, the general diffuse small-celled infiltration had given place in one eye to generalized fibrous tissue formation throughout the section.
- (6) In no case could Prowazekia bodies be definitely distinguished in the epithelium in sections, nor was there much small-celled infiltration of the epithelium itself.

Discussion and comparison of results

My experience in India shows that the trachoma problem is one affecting the indigenous population almost exclusively. I have seen no trachoma in British soldiers in four years, and very few cases of doubtful chronic folliculitis suggestive of trachoma. Two British officers presenting suspicious folliculitis, after twelve months' observation, were considered not to have suffered from trachoma. In only one European, the wife of a British sergeant, whose eye trouble had begun in Egypt, did I find definite trachoma (Tr. III).

As far as British troops are concerned there is no appreciable incidence similar to that reported by Eason (1919) and quoted by MacCallan (1932) as occurring among British troops serving in Egypt and Palestine between 1916 to 1918, but undoubtedly occasional instances of Europeans becoming infected do occur, similar to those recorded by MacCallan (1931) and Cuenod and Nataf (1930). As pointed out by the former from his work in Egypt and by Motais (1932) from Cochin China, the chief source of infection is probably the native servants.

Among Indian troops the disease is much more common, the incidence being greatest among the inhabitants of the Punjab. Strother Smith (1927) has mentioned finding 42 cases of trachoma (all old Tr. III) among 700 Punjabi soldiers—a trachoma incidence of 6 per cent. He does not state the community to which they belong, but his figure is much lower than my minimum figure of about 26 to 30 per cent amongst Punjabi Mussulmans. Among Sikhs, the other Punjab community furnishing the majority of army recruits from that province, the disease is much more widespread. My figures for Sikh recruits—75 per cent incidence—and Sikh sepoys—81 per cent incidence—show a constantly very high ratio which is in accord with the generally accepted state of affairs.

Previous to 1930 the attitude of Army Headquarters was to reject all recruits suffering from trachoma. In 1926 a series of lectures and demonstrations to recruiting medical officers was arranged by the authorities; in these Dickson, after describing in detail the manifestations of trachoma, recommended a test treatment 'to distinguish diseases which are not trachoma'. This consisted of hydrargyrum perchloridum 1—5,000 and brushing of the lids with silver

nitrate 2 per cent on alternate days, for three applications, followed by argyrol 10 per cent three times a day until ten days had elapsed. It was explained that this would effect a cure in the majority of cases not due to trachoma. If still doubtful the recruit was to be rejected. Dickson quoting his experience among the labour corps in France (men recruited from China, Egypt and the Cape) mentioned two Chinese companies where, at an initial examination, in the one 12 cases of trachoma were found, in the other 15, while after eight weeks without any precautionary methods or treatment being carried out, the number of infected had increased to 59 in the first and 81 in the second company. By segregation and treatment further spread was controlled. The conclusion to be drawn from this was that, bearing in mind how the disease was intractable and liable to relapse, 'the loss to the State in recruits is of no consequence compared with the danger of spreading the disease amongst the troops' and 'the enlistment of these cases is a bad bargain to the State'.

In October 1930 the experiment of enlisting otherwise suitable recruits who were suffering from 'very mild trachoma' was tried in three recruiting centres. Such recruits were to have three months' constant treatment by their unit medical officers and inspection at the end of that time by the ophthalmic specialist; at the same time instructions regarding segregation and hygiene were issued to the commanders concerned. After three months the condition of the recruits had progressed well though they could not yet be considered clear, and the experiment met with such success that in May, 1931 it was greatly extended. During the nine months from May 1931 to January 1932, 653 cases of trachoma that had enlisted were considered cured, and 65 only discharged as incurable. Investigations carried out about that time in the Jullundur district of the Punjab by the specialist in ophthalmology, Lahore, showed that all the Sikh recruits, who totalled 95 per cent of those offering themselves for enlistment, were infected. Of these 35 per cent belonged to class (a) (corresponding to Tr. I and Tr. II, MacCallan), 52 per cent belonged to class (b) (corresponding to Tr. III, MacCallan, moderately severe), and 13 per cent belonged to class (c) (corresponding to Tr. III, severe, or Tr. IV, with gross lid deformity, corneal involvement).

It was also recorded that skilled examinations in many Indian regiments showed a trachoma percentage of 25 to 30 amongst men who never reported sick. This percentage was higher where Sikhs only were concerned and the great majority of these were first-class shots, and throughout their service never reported sick with eye symptoms. Therefore in June 1932 it was decided that all trachoma cases in classes (a) and (b) above should be enlisted, and only the fact that they were suffering from trachoma

would be noted on their medical history sheets, but that unless they reported sick the eye condition would be ignored. At present this is the position regarding enlistment of recruits for the Indian Army, which occasioned the statement of the D. M. S. (April 1932) that 'It is evident that our difficulties in connection with trachoma have been greatly enhanced by our lack of knowledge of the disease as it occurs in India'.

The results of my independent observations, carried out in an endeavour to obtain a working knowledge of trachoma in the military and civil population, go to confirm these findings and support this change of policy by the military medical authorities in this country.

1. In Punjabi sepoys (excluding Sikhs) the incidence remained at 20 to 30 per cent (with the exception of the cavalry unit examined, where men of the same community showed a trachoma incidence nearly double—52 per cent).

2. In Sikh infantrymen the minimum incidence was 56 per cent with an average figure of 82 per cent. These figures are much higher than a similar average for any other community and confirm the opinion already held by Army Headquarters.

3. In Sikh recruits, excluding 10 per cent classified as doubtful, I regarded 75 per cent as definitely trachomatous, which figure, though less than that found at the Jullundur inspection, is twice as great as the incidence in the recruits of any other community, and furnish the only rejections among all the recruits examined, *viz.*, a rejection incidence of 3.8 per cent in a trachoma incidence of 43 per cent, instead of the 10 per cent rejection mentioned by Army Headquarters, during nine months' observation.

4. During the two years that have elapsed since the enlistment of trachoma-infected recruits has been in force, I have seen no cases of direct contact infection, and my observations confirm the opinion that direct contact infection among sepoys in the Indian Army is not a danger to be greatly feared; no fresh case of trachoma was found in a unit having 43 per cent incidence at initial examination; and only one very doubtful case among a community of Mahrattas from the Deccan, serving as one-third of a mixed unit with one-third Punjabi Mussulmans, with a trachoma incidence of 26 per cent, and one-third Sikhs, whose trachoma incidence though not recorded can be assumed to be at least twice as great as the Mussulmans.

Concerning this problem of the spread of trachoma in armies which has greatly exercised military medical authorities in various countries, De Grosz (1905 and 1929) pointed out that trachoma cases should be treated in the army and not discharged and Angelucci (1917) and Morgan (1917) later emphasized the same point, while Schousboe's (1925) proposals for the classification of those enlisted with trachoma, and the advocacy by Talbot (1929) of the forming of trachoma units in which trachomatous

recruits serve till considered cured, indicate the present position of this problem in armies elsewhere. In this country it does not appear to be of such paramount importance, and this departure by Indian military medical authorities from the measures adopted in the armies of other trachoma-endemic countries would seem to be safe and justified.

Notable points are:—

1. Service in the Indian Army being voluntary there is no question of evasion as there may be in conscripted armies.

2. The decision of Army Headquarters to regard trachoma, even though apparently aggravated by accident during military service, as 'not due to military service' for the purpose of invaliding pensions, obviates the possibilities of self-inoculation with trachoma referred to by De Grosz (1905) and Talbot (1929).

3. The amount of direct contact infection, judging from the results mentioned above, is negligible.

4. The only danger is a loss to the State on account of accident or intercurrent conjunctivitis lighting up a quiescent trachomatous condition, and resulting in severe corneal complications reducing vision below the required standards.

Though the examination of recruits shows an average trachoma incidence of not less than 43 per cent yet of those considered trachomatous only 4.3 per cent were cases of early trachoma (Tr. I and Tr. II), *i.e.*, trachoma in the most infective stages; the vast majority being old-standing cases which, like most trachoma in India, had been present since infancy, with a tendency to progress slowly to a quiescent stage and natural healing—Tr. IV.

Similarly, diseases which had been present since infancy, by the age of enlistment—18 to 20 years—had either developed in a severe fashion with severe corneal involvement reducing vision below army requirements (6/18), resulting in rejection of the recruit, or had in a milder form gradually passed from the infectious stages Tr. I and Tr. II, to become late mild Tr. III or Tr. IV by the time of enlistment. The examinations of Quetta school children does not show a change in the incidence of Tr. I and Tr. II from over 40 per cent to under 10 per cent during school years as MacCallan has demonstrated, but instead appears to point to a fairly constant incidence of the active infective stages among the children in Baluchistan, roughly 20 per cent, with the later stages, Tr. III and Tr. IV, slightly higher up to 26 per cent; while the ratio of early Tr. I and Tr. II to Tr. III and Tr. IV changes from 17:15 at ten years to 15:18 at fifteen years and over. These are in children who have never received any treatment, while MacCallan's figures are influenced by constant school treatment extending over two to three years.

The slowness of this change from Tr. I and Tr. II to late Tr. III and Tr. IV shown by these

school statistics confirms the opinion that the vast majority of the trachoma seen in Indian Army recruits and sepoys has begun in the early years of life and progressed slowly since that age.

This opinion, namely that trachoma infection in most cases begins in early pre-school life even in infancy, is held by many trachoma workers. The emphasis with which Morax and others stressed it in the early part of this century is still recognized by workers in different countries.

MacCallan has demonstrated the certainty with which the infant of a trachomatous mother is bound to develop the disease. Morax (1931) in more recent work has not modified his earlier opinion. Crouch (1929), from his experience among North American Indians, holds the same view, as does Talbot (1932) in Tunis, while Wilson (1931), working in Bahrim, found that, of 140 children under one year old, 25 per cent showed Tr. I (and 38 per cent of the total had acute conjunctivitis) and is of the opinion that most trachoma infection occurs before one year of age.

Also in these school children the percentage of trachoma was considerably higher—57.9 per cent—among those children showing no signs of grossly diseased tonsils and adenoids, than among those showing definite signs of the adenoid syndrome—42.1 per cent. This finding does not accord with the views of Angelucci (1929 and 1930) and Piquero (1932) that adenoidism produces a suitable soil for the infection. It may be that in a trachomatous individual the disease is more prone to develop in a more severe form if the patient also suffers from adenoids. Although Quetta school children, especially Sikhs, show a lower incidence than might be expected, judging from the Jullundur findings and my findings among recruits, this is due in all probability to the fact that the children examined, though children of Punjabi Sikhs, have been born and reared in an environment different from their Punjab villages, and further because the majority are the children of town Sikhs who follow different occupations, e.g., carpenters and shopkeepers, from those of the agricultural class in whom the disease is rampant in the Punjab and who furnish the army recruits.

The varying community incidence which is seen in other countries as shown by Talbot (1930) with an incidence around 30 per cent in the French schools and 53 per cent in Franco-Arabic schools, also by Junes (1931) with 10 per cent incidence in the former, 50 per cent in the latter, and by Kanda and Takizawa (1928) in Formosa (28 per cent among Japanese and 68 per cent Formosan), and that recorded by Fonseca (1932) in Brazil, is easily understood where the indigenous populace is compared with that of the much more highly educated colonizing race; but in India the varying community incidence is among people of the same race (descended from the same stock) living under

similar conditions though differing in habits. It is said that in Indian villages the incidence varies greatly in individual villages of the same community and also probably in individual schools of the one community, just as is reported by Bakker (1928) regarding Java schools, and such variation is undoubtedly influenced by living conditions, individual hygiene, etc.; but the remarkably constant difference in incidence among the agricultural class of Punjabi Mussulmans and Sikhs is more difficult to explain. It will be considered later.

The examination of Gurkhas stationed in Quetta provides the explanation for the cases of early trachoma Tr. I and Tr. II found in soldiers, which though much less common than the cases infected in early life occur even in mild epidemic form. Gurkha recruits (ages 17 to 20) on arrival in British India from Nepal are free from trachoma, yet Gurkha riflemen after five to ten years' service in India show definite evidence of the disease (8.7 per cent). Though the 'line boys' furnish one source of trachoma among these troops the chief factor in my opinion is infection of the men from their families. It is evident why this is a more prominent feature than among Indian units when it is seen that after two or three years' service Gurkhas are allowed 27 per cent to 100 per cent married quarters in the unit lines while Indian units spend most of their service separated from their families.

Also, Gurkha families suffer from acute Koch-Weeks conjunctivitis in epidemic form each summer; I have found this condition in Gurkha families both in Baluchistan and the North West Frontier Province and after it has subsided it leaves behind definite (27 per cent) evidence of fresh early trachoma (Tr. I and Tr. II), which in my opinion forms the source from which the men showing Tr. I and Tr. II become infected. In confirmation of this it was found that the only cases of advanced Tr. III with corneal complications in Gurkhas reporting sick for treatment have been in 'line boys' who were infected with trachoma in a similar manner during their early childhood in the unit family lines.

This rôle played by secondary conjunctival infections, especially Koch-Weeks, in the spread and course of trachoma is widely recognized. Strother Smith (1927) referring to trachoma in the Punjab—the most highly trachoma-infected province in India—states that 50 per cent of the school children there are found suffering from some form of conjunctivitis. De Peyrelongue (1927) in Syria and Zachert (1927) in Tunis record the high proportion of trachoma cases in those countries which are secondarily infected, while the latter author considers such secondary infection the cause of serious corneal complications occurring in trachoma. Similarly MacCallan and Wilson recognize the linking of the diseases. To quote the latter, they consider

'that trachoma is an infectious disease *sui generis* and that preceding infections are not necessary precursors of the disease. At the same time, we believe that the trachoma virus will flourish more readily on an unhealthy conjunctiva and likewise that mixed infections are probably potent causes of the spread of trachoma'.

So those factors influencing the epidemic spread of such acute conjunctival infections likewise influence trachoma, and these authors show their relation to climatic condition (variations in temperature, humidity, etc.), also the part played by flies is considered important. While it is generally recognized that the usual method of spread of trachoma is digital, by infected towels, handkerchiefs, etc., MacCallan (1931) admits that flies do play a part, even though it be a minor one, in the propagation of the disease. Wilson (1931) regards them as important carriers of acute conjunctivitis infection, while Said (1927) correlates the spread of trachoma in Syria with the associated plague of flies, and Cuenod and Nataf (1930), from their experience of trachoma spread in the human being and as the result of their experiments with trachoma transmission by flies in baboons, are of the opinion that flies are largely responsible as a means of spreading the disease.

In judging the results of the treatments carried out in active cases of the disease observed, it is to be noted that the main endeavour was to find some procedure giving a more rapid healing than the older methods. Even bearing in mind the views of such observers as Bishop Harman (1931) who is sceptical of the diagnosis when a case of suspected trachoma reacts speedily to treatment, and Strother Smith (1927) who, in the light of further experience, has come to regard those cases, which he had reported in 1912 as showing rapid response to trachoma treatment, as cases of simple chronic conjunctivitis, I am convinced that certain of the short courses recorded in my series achieved rapid improvement or clinical cures in cases of true trachoma.

Excluding the 8 per cent doubtful Tr. I and Tr. II or chronic folliculitis, which probably were innocent, of the 57 per cent cases Tr. I and Tr. II as resulting in clinical cures, at least three-quarters were undoubtedly early trachoma which had not only resisted treatment measures for ordinary folliculitis but were becoming more severe until trachoma treatment was commenced.

All showing Tr. III signs were unquestionably definite trachoma and of these 6.8 per cent were rendered clinical cures and 34 per cent rapidly healed to Tr. IV after the treatment employed.

In the findings of conjunctival scrapings there was no one special finding typical of trachoma sufficient to be diagnostic, but the combined findings of abundant large lymphocytes, Prowazekia bodies and Leber's cells, from which Cuenod and Nataf (1930) consider an almost

certain diagnosis of trachoma can be made, were seen. As Wilson (1931) says 'there is really very little to distinguish the early stages of trachoma from other follicular conditions of the conjunctiva' though he considers that there is a more marked proportion of large lymphocytes in follicular conjunctivitis; by this means therefore an infallible diagnosis could not be made. Similarly sections of the lining membrane and tarsus are not practicable for diagnostic purposes in the early stages, and in the later stages are unnecessary, so that at present microscopy does not supersede clinical diagnostic methods.

From this study of trachoma in Baluchistan certain features of the disease as it occurs in India are found to correspond to its manifestations in other countries, also local peculiarities, differences and difficulties are found.

1. Though similar in its manifestations to the disease met with in other tropical countries it differs from the Egyptian variety in certain ways:—

(a) The average incidence among the inhabitants of the Punjab, the most highly infected district (as judged by the examination of army recruits), may be no higher than 43 per cent while in Egypt more than 90 per cent of the population are regarded as infected (El-Bakly, 1932).

(b) The severe complicated variety with marked pannus and corneal ulceration is not so common in India as in Egypt, this being at its worst only among the very poor and the lowest castes (sweepers), who besides being undernourished are always employed in the dirtiest of occupations and are rarely other than filthy in person.

(c) The form of the disease seen in town school children and military recruits differs considerably from that met with among the poor cultivator class; in the former, it is mild and shows a tendency to slow change to a quiescent or healed stage, in the latter it more nearly approaches that referred to by Egyptian workers.

(d) Like the Egyptian form it is most often found complicated by secondary conjunctival infections, especially by the Koch-Weeks bacillus and *B. morax*, on account of which the patients demand treatment; but only occasionally—probably only in certain districts—with spring catarrh and very rarely with gonorrhoeal ophthalmia.

2. The incidence of the disease varies greatly in different localities throughout the country. Herbert and Elliot are quoted by Cuenod and Nataf (1930) as estimating a trachoma incidence of 10 to 20 per cent (presumably in Bombay and Madras). Wright (1929) judging from his work in Madras has variously declared it to be from 3.3 per cent to 4.5 per cent in that presidency while my figures for examination of Punjabis show an incidence of 20 to 30 per cent

among Mussulmans and 75 to 80 per cent among Sikhs.

So Wright's figures from Madras, where trachoma is undoubtedly uncommon, give an entirely fallacious idea of the general incidence of the disease throughout the country.

3. The majority of cases show a mixture of follicles and papillæ with one or other type of lesion predominating in different individual cases.

4. The constantly high incidence among Sikhs is difficult to explain, and though no definite reason for it can be determined it throws light on certain points. The mode of life of this sect of purely Punjabi origin does not differ greatly from their neighbours. In their villages they are agriculturists like the majority of Punjabis; in towns they are found chiefly as carpenters, joiners, etc. In habits they are if anything more cleanly than their Mahomedan neighbours, though, on account of their religious custom of never cutting the hair, their head ablutions may not be as easily or frequently performed as among other Punjabis with closely-cropped heads. On the other hand as a community they indulge a lot in communal religious bathing ceremonies performed in sacred tanks at their temples. In my opinion this mistaken religious hygiene is a prominent factor in explaining the constantly high incidence of the disease among them without causing an equal spread to other communities of the same district.

5. The constant community incidence which has been shown among the various classes of soldiers and civilians is kept so by the caste system prevailing in the country. Though Sikhs, Mussulmans and Hindus may mix together at schools, games or in after life at work in the country or towns, or in army service, their intimate relations are confined to their own communities and homes. They will only eat with fellow religionists and their food and utensils are prepared either by their own co-religionists or by themselves, while any common sanitary arrangements such as washing, towels, etc., though they may be common to their family or relations will not be more widely used.

6. Another feature, in connection with the prevalence of the disease among Sikhs and its higher incidence in the Punjab than elsewhere, is that in stature, development and physique the Sikh excels, being robust and muscular, showing no signs of predisposition to deficiency disease, while the Punjabi diet is a good mixed diet of atta (Indian flour), dāl (lentils), meat, ghi (fat), milk and fruit—nutritious and vitamin-containing in comparison with the diet of the southern Indian whose main article of diet is rice.

When it is remembered that such deficiency diseases as beri-beri and keratomalacia are uncommon in the Punjab and frequent in the

south [Wright (1932) regards the latter condition the chief cause of preventible blindness in children in India] where trachoma is rare, it appears to negative the suggestion of Royer (1926) and Kirwan (1927) that the disease is a deficiency one.

7. The examination of a cavalry unit which showed a trachoma incidence twice that of infantrymen of the same community, the greatest intra-community variation I found, together with the lower incidence among town-bred Sikh children born and reared in Quetta instead of in Punjab villages, suggests an environmental influence. The increased incidence and higher proportion of earlier cases seen in the cavalrymen suggests a bigger percentage of recent infections comparatively late in life. I consider this is influenced by their more constant contact with animals and the products of the soil.

The lower incidence among Sikh children living in Quetta, in more urban though no less dusty and dirty surroundings than in their Punjab homes, is due to being less in contact with agricultural pursuits.

The one common feature of the countries where trachoma is endemic is that they are agricultural countries, the majority of the sufferers being of the agricultural class. Egypt, India, Ireland, Russia, Poland all come under this category, and though in these countries the infection is undoubtedly more common among the poor and dirty, the poverty, dirt, undernourishment or lack of hygienic surroundings cannot equal those of the slums of the large European cities of industrial countries, where though trachoma is found it is distinctly less frequent. Is the trachoma virus a soil infection which infects those in contact with the soil and its products, spreading further in unhygienic home surroundings?

8. Most trachoma workers consider that until the causal virus is discovered no great advances in our knowledge of the disease can take place, but it is not certain that even though the microbic cause of the disease is found the main part of our problems will be solved.

9. In the study of trachoma, researches for the microbic causes of the disease must be pursued, though at present there are no immediate prospects of the discovery. The significance of Prowazekia and other inclusion bodies has long been in doubt, and apart from the American observers, Olitsky, Knutti and Tyler (1932), the recent opinion of most investigators elsewhere—Morax (1930 and 1931), Favoloro (1932), Rieger (1932), etc.—is to regard Noguchi's *B. granulosis* as typical of a folliculitis not necessarily trachoma.

Meanwhile the campaign against the disease must be continued, and it would appear that more expert clinical methods, especially by the slit-lamp, will simplify the diagnosis of the disease. Though El-Bakly (1932) is of the opinion that the study of the cornea is not a

great help in the diagnosis of the disease in the doubtful stage, Wilson (1932) considers it of extreme value in the differential diagnosis in doubtful cases especially if mild, while Howard (1933), in his recent review of trachoma-diagnosis literature, conveys the impression that it is in this field that advances in our knowledge are likely to lie.

10. Apart from infection in infancy the main danger of trachoma infection lies in the spread of the disease along with Koch-Weeks or other types of acute conjunctivitis. Whether the disease is latent and only rendered active by the secondary acute conjunctival infection or whether it is spread in epidemic form, a study of the disease among Gurkhas in British India shows a definite spread of fresh trachoma after such epidemics.

To combat this in such a community where laws of hygiene are little understood or practised, a polyvalent vaccine such as recommended by Durand and Lumbroso (1927) should prove of service. From their work in Tunis they found that such a vaccine had no bad effects of any kind and only 9.3 per cent of vaccinated children harboured the Koch-Weeks bacillus as against 30 per cent unvaccinated.

11. From the result of the treatments carried out in this series it is shown that in the majority of cases met with in the army a mild remedy such as sodium chloride in fine powder, massaged into the affected conjunctiva, produces clinical cure very rapidly, while in the more florid type, seen especially among the peasant class, an initial scraping with Volkman's spoon removes the grossly unhealthy follicular masses, often leaving in view a non-infected though œdematous tarsus underneath, so that the cure can be completed by reverting to the sodium chloride massage. I am convinced that if sodium chloride massage were used on a wide scale, especially in children in the pre-school and early school years, instead of the multifarious remedies at present employed by the rank and file of those practising European methods in Indian bazars and villages [*vide* Kewal Ram (1931) who mentions that no fewer than forty-four different remedies varying from native herbs to radium are recommended, without distinction, as useful in the treatment of the disease], marked progress could be made in clearing up the manifestations of the disease.

Conclusions

1. The trachoma problem in India is one which concerns the indigenous population.

2. The incidence of the disease varies greatly in different districts being highest in the Punjab and least in southern India.

3. Among the different communities the disease is present among the different classes of the same community in a fairly constant ratio.

4. Of all the various religions and castes, Sikhs in which the incidence is at least 75 per

cent are those mainly affected, while among southern India Hindus it is practically non-existent.

5. From a study of the disease in the Indian Army most of the cases met with are old, the disease obviously having begun in early life and a large proportion being healed by adult life.

6. On this account we can conclude that the scheme of enlisting recruits suffering from trachoma—which differs from the policy in the armies of other trachoma-endemic countries—is safe and justified, and is unlikely to cause any serious spread to the healthy troops on account of (a) the better hygienic life of the sepoys in comparison with the overcrowding, etc., of Indian village life, (b) the rigid caste system which prevails in army life even when men of different communities are brought together in barrack life, and (c) most of the trachoma being healed or almost healed by the time the age of enlistment is reached.

7. Like Egyptian trachoma most of the infections occur in the homes of the agricultural classes among young children even before school life.

8. Fresh cases in adults are similarly derived from their infected families, especially during epidemics of Koch-Weeks ophthalmia.

9. A treatment measure, such as Saliberry's sodium chloride massage which is cheap, simple, quickly effective and safe in application, is required if the disease is to be effectively treated by any other than a few ophthalmic experts.

10. A national anti-trachoma scheme is necessary, involving wide propaganda on the nature and results of the disease amongst

- (a) Indian practitioners who practise European methods in this country,
- (b) school teachers and educated social workers, and
- (c) the agricultural classes themselves, especially the womenfolk, by means of the two channels above mentioned.

Such a scheme should enlist the co-operation of

(a) the existing research institutions wherein animal and human experiments could be carried out to improve our present knowledge of the disease,

(b) the large military and civil hospitals and institutions where new treatments could be investigated,

(c) the medical colleges and universities where the rank and file might be taught the manifestations of the disease in a practical form to enable them to distinguish the disease and practise its prevention and treatment with safety, and

(d) the village and bazar doctors who alone can carry the treatment campaign to the masses of the people in the form of some standard simple treatment of sufficient prophylactic and curative value, while serious or complicated cases could be treated under the supervision of

a district trachoma authority, or operated on in one of the district centres.

11. If in the beginning such a scheme were confined to the most heavily infected province and limited to children as a child welfare scheme, it would serve as an introduction.

REFERENCES

- Angelucci, A. (1917). *Ann. Ottal.* (Napoli).
 Angelucci, A. (1929). *Arch. Ottal.* (Napoli), Vol. XXXVI, p. 473.
 Angelucci, A. (1930). *Bull. Mem. Soc. Franc. d'Ophth.*
 Arlt (1881). *Klinische Darstellung d. Krank. d. Aug. Wien.*
 Aubaret (1928). *Rev. Prat. Malad. Pays Chauds*, Vol. VIII, p. 424.
 Bakker, C. (1928). *Geneesk. Tijdschr. Nedcul-Indie*, Vol. LXVII, p. 1082.
 Bonnet (1927). *Algerie Medicalc.*
 Bonnet (1928). *Bull. Soc. Ophth., Paris.*
 Coppinger, W. V. (1927). *Trans. 7th Congress, F. E. A. T. M.*, Vol. I, p. 316.
 Crouch, J. H. (1929). *Pub. Health Rep.*, Vol. LIV, p. 637.
 Cuenod, A., and Nataf, R. (1930). *Le Trachoma*. Masson et Cie, Paris.
 Cuenod, A., and Nataf, R. (1931). *Arch. d'Ophth.*, Vol. XLVIII, p. 737.
 De Grosz (1905). *Soc. Hongroise d'Ophth.*
 De Grosz (1929). *Congress d'Amsterdam.*
 Delanoe, Mme E. (1926). *Bull. Soc. Path. Exot.*, Vol. XIX, p. 49.
 Delanoe, Mme E. (1928). *Presse Med.*, Vol. XXXVI, p. 828.
 De Peyrelongue (1927). *Rev. Internat. Trachome*, Vol. IV, p. 107.
 Durand, P., and Lumbroso, U. (1927). *Arch. Inst. Pasteur, Tunis*, Vol. XVI, p. 365.
 Eason (1919). *Bull. Ophth. Soc., Egypt.*
 El-Bakly, M. A. (1932). *Bull. Ophth. Soc., Egypt*, Vol. XXV, p. 77.
 Elliot, R. H. (1920). *Tropical Ophthalmology*. Henry Frowde, and Hodder and Stoughton, London.
 Favoloro, G. (1932). *Rassenga Ital. d'Ottal.*, Vol. I, p. 26.
 Fonseca, A. (1932). *Brazil Medico*, Vol. XLVI, p. 457.
 Fuchs, H. E. (1924). *Textbook of Ophthalmology*. J. B. Lippincott Company, London.
 Gubbay, R. (1929). *Indian Med. Gaz.*, Vol. LXIV, p. 563.
 Harman, N. B. (1931). *Amer. Journ. Ophth.*, Vol. XIV, p. 310.
 Harston, G. M. (1928). *China Med. Journ.*, Vol. XLII, p. 497.
 Harston, G. M. (1931). *Brit. Journ. Ophth.*, Vol. XV, p. 717.
 Herbert, H. (1904). *Trans. Ophth. Soc., U. K.*, Vol. XXIV, p. 67.
 Herbert, H. (1907). *Ibid.*, Vol. XXVII, p. 38.
 Howard, H. J. (1933). *Amer. Journ. Ophth.*, Vol. XVI, p. 132.
 Junes, E. (1931). *Rev. Internat. Trachome*, Vol. VIII, pp. 27 and 230.
 Kanda, K., and Takizawa, T. (1928). *Journ.-Med. Assoc., Formosa*, April, No. 277.
 Kewal Ram, B. I. (1931). *Practical Med.*, Vol. XXIX, p. 23.
 Kirwan, E. O'G. (1927). *Trans. 7th Congress, F. E. A. T. M.*, Vol. I, p. 316.
 Lister, W. T. (1923). *Official History of the Great War, Medical Services, Surgery of the War*, Vol. II. His Majesty's Stationery Office, London.
 MacCallan, A. F. (1931). *Brit. Journ. Ophth.*, Vol. XV, p. 369.

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SODIUM EVIPAN ANÆSTHESIA—A STUDY OF 30 CASES

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THE only way to assess the true value of a new drug is by the sharing of the experiences of independent workers with that particular drug. No apology is needed, therefore, for a report on 30 operations which were performed under sodium evipan. The following list shows the nature and variety of the operations in which it was used :—

Salpingectomy, excision of broad ligament cyst, laparotomy for peritonitis (3), appendicectomy and appendicular abscess (3), Cæsarean section (2), sub-total hysterectomy (2), ventral hernia (2), strangulated hernia, irreducible

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- MacCallan, A. F. (1932). *Brit. Journ. Ophth.*, Vol. XVI, p. 124.
 Millet, A. H. (1924). *Ann. d'Oculistique*, Vol. CLXI, p. 656.
 Morax, V. (1929). *Rev. Internat. Trachome*, Vol. VI, p. 90.
 Morax, V. (1930). *Ibid.*, Vol. VII, p. 2.
 Morax, V. (1931). *Ibid.*, Vol. VIII, pp. 1 and 133.
 Morgan (1917). *Ann. Ottal.* (Napoli).
 Motaïs, F. (1932). *Rev. Internat. Trachome*, Vol. IX, p. 30.
 Nicolle, Ch. (1927). *Arch. Inst. Pasteur, Tunis*, Vol. XVI, p. 378.
 Olitsky, P. K., Knutti, R., and Tyler, J. R. (1932). *Journ. Exper. Med.*, Vol. LV, p. 803.
 Piquero, P. (1932). *Arch. Ottal. Hispano-Am.*, Vol. XXXII, p. 87.
 Prowazek and Halberstaedter (1907). *Deut. Med. Woch.*, Vol. XXXIII, p. 1285.
 Rieger, H. (1932). *Graef's Arch. Ophth.*, Vol. CXXXVIII, p. 312.
 Royer, B. F. (1926). *Journ. Amer. Med. Assoc.*, Vol. LXXXVII, p. 482.
 Said, R. (1927). *Rev. Prat. Malad. Pays Chauds*, Vol. VII, p. 547.
 Saliberry, Martinez (1930). *Rev. Oto-Neuro-Ottal. y. de Chirug. Neurol.*, Vol. V, p. 551.
 Schousboe (1925). *Rev. Internat. Trachome*, Vol. II, p. 15.
 Seoud, G. A. (1927). *Bull. Ophth. Soc., Egypt*, Vol. XX, p. 79.
 Smith, H. (1928). *The Treatment of Cataract and Some Other Common Ocular Affections*. Butterworth & Co., London.
 Strother Smith, F. F. (1927). *Trans. 7th Congress, F. E. A. T. M.*, Vol. I, p. 311.
 Swanzy, H. R. (1925). *Handbook of the Diseases of the Eye, and their Treatment*. H. K. Lewis & Co., London.
 Talbot (1929). *Rev. Internat. Trachome*, Vol. VI, p. 28.
 Talbot (1930). *Ibid.*, Vol. VII, p. 112.
 Talbot (1932). *Ibid.*, Vol. IX, p. 12.
 Wilson, R. P. (1931). *Sixth Ann. Rep. Giza. Mem. Ophth. Lab., Cairo*, p. 88.
 Wilson, R. P. (1932). *Bull. Ophth. Soc., Egypt*, Vol. XXV, p. 92.
 Wright, R. E. (1928). *Annual Report Ophth. Govt. Hosp., Madras. Supdt., Govt. Press, Madras.*
 Wright, R. E. (1929). *Ibid.*
 Wright, R. E. (1932). *Brit. Journ. Ophth.*, Vol. XVI, p. 473.
 Zachert, M. (1927). *Arch. Inst. Pasteur, Tunis*, Vol. XVI, p. 391.

inguinal hernia, bubonocoele, tonsillectomy (2), double hydrocele, dilatation and curetting (6), evisceration of eye for panophthalmitis, cellulitis of neck (temperature 104°F.), and two other operations.

Age limits.—The youngest patient to whom sodium evipan was administered was a girl of 15, for whom tonsillectomy was done, and the oldest was a woman of 68 with a long-standing ventral hernia.

Method of administration.—Sodium evipan is a snowy-white powder put up in ampoules of 1 gramme each. Ampoules containing 10.5 c.cm. of sterile distilled water are also supplied for the preparation of the solution. The manufacturers advise intravenous injection of the freshly-prepared solution at the rate of 1 c.cm. per 15 seconds, while some authors advocate the very slow rate of 1 c.cm. per minute. In my experience, any speed from 15 to 30 seconds per c.cm. is suitable. The patient is asked to count slowly as the injection is given. Most patients lose consciousness after 3 c.cm. or 45 seconds, while some become unconscious only after 3.5 c.cm., and others as early as after 2 c.cm. One educated Anglo-Indian lady, asked as to how she felt during the injection, replied that she felt 'an irresistible desire to go to sleep'. The majority of the patients yawn before they lose consciousness.

Dosage.—The dosage depends chiefly on the relaxation of the jaw. The necessary dose varies very much from case to case. Any quantity from 5 to 10 c.cm. of the solution may be needed. Along with the relaxation of the jaw, the quantity within which the patient loses consciousness and stops counting also helps in determining the dose. Thus, a patient who stops counting early will require a smaller dose than one who counts longer. We have not yet come to any conclusion as to the relationship between the dosage and the duration of anaesthesia. We have observed cases where 2 c.cm. of the solution repeated when the patient was about to come round, would keep him under for a few more minutes. In three cases which received 2, 4 and 6 c.cm. respectively, though the dosage in each case was not sufficient to keep the patient under, the quantity of chloroform subsequently needed was substantially reduced, and the troublesome state of excitation avoided.

Relaxation.—Once the patient gets under, the respiration is slow and steady, and the relaxation of the abdominal wall is extremely satisfactory. The value of this feature in abdominal sections cannot be over-estimated. Another peculiarity we have observed is that even when other muscles, such as those of the limbs, are not fully relaxed, or when the patient is beginning to come round as indicated by the reappearance of the corneal reflex, the abdominal wall still remains flaccid, thus allowing the operation to go on undisturbed. This feature is in contrast

with the stiffening of the abdominal muscles, which is so annoying, when enough chloroform is not administered. An almost constant phenomenon is the spasmodic jerks of the limbs, these are usually weak and few, but were in a few cases strong and frequent. In two cases, tremors of the whole body were observed when the operation was started after injecting 10 c.cm. of evipan, which was not enough to get the patients under.

Duration of anaesthesia.—The effect of evipan is said to last from 15 to 20 minutes but there were in this series more than half a dozen major operations, including two Caesarean sections, and one for ventral hernia, each of which lasted from 20 to 30 minutes. A sub-total hysterectomy and a laparotomy for an appendicular abscess with extensive adhesions were performed, each operation lasting for 45 minutes. No other anaesthetics were administered in these two cases, and the relaxation was splendid throughout. Several operations, up to a maximum duration of one hour, have been carried out with sodium evipan supplemented by chloroform or A.C.E. mixture. The combination of these drugs seems to cause no ill effects. In one case of sub-total hysterectomy for a very large cervical fibroid 11 c.c. of sodium evipan and 4½ drachms of A.C.E. mixture were administered, while one old woman of 68, the oldest of our series, with a very difficult ventral hernia, was given 10 c.cm. of evipan supplemented by 5 drachms of chloroform. The closed method with the Harcourt inhaler was used in both these cases. These two operations lasted for one hour each, and were successfully completed, no bad after effects being noticed.

The corneal reflex.—The corneal reflex disappears immediately after the injection of sodium evipan. In one case of laparotomy for peritonitis and one of appendicectomy, however, lasting 18 and 30 minutes respectively, the corneal reflex was retained throughout, though the patients were well under as shown by good relaxation of the muscles. The reappearance of the corneal reflex does not indicate that the state of anaesthesia has definitely come to an end. It is usually possible to continue the operation from five to ten minutes after its appearance. This is especially so in abdominal operations, as mentioned before.

Post-operative symptoms.—The majority of the patients go quietly to sleep after the operation and wake up three to six hours later, feeling quite refreshed. One man of 25, a case of tuberculous peritonitis, on whom a laparotomy was performed, was in a semi-narcotic stage for 15 hours after the operation, becoming fully conscious of his surroundings only on the morning after. The dose of evipan in this case was 10 c.cm. and the duration of the operation 20 minutes. In ten of the cases, including five of abdominal operations, the patients became very boisterous soon after being

removed to the ward, and had to be given either morphia or eukodal to quieten them. One woman was so violent that two eukodal injections had to be administered to keep her quiet. Only one of these ten cases was ascertained to be a regular arrack drinker. In contrast with chloroform, there is no tendency for the patients to vomit after the operation.

Untoward signs.—So far, untoward signs have neither been frequent nor alarming enough to make us afraid of this new anæsthetic. Three of our patients did not however respond to sodium evipan, though the maximum dose of 10 c.cm. was injected in each case. Chloroform had to be administered subsequently. One of these three patients was strongly addicted to arrack and had also chronic bronchitis. He started coughing violently when the operation was begun after 10 c.cm. of evipan had been injected and much chloroform was used before the cough could be controlled.

We have on record only two cases which caused any anxiety, but both of them were revived easily and speedily. One of them was a young woman whose uterus was being evacuated after an incomplete abortion. After 8 c.cm. of evipan, she became cyanosed, her respiration was shallow, and the pulse weak; but this lasted for less than a minute, and an injection of ether soon set her right. This was the second time that sodium evipan had been administered to her, the same operation having been done on her with the same dose of evipan five days previously with no ill effects.

The second case, a girl of 15, the youngest patient on our list, whose tonsils were removed after an injection of 8 c.cm. of evipan, had a compensated double mitral lesion of the heart, rheumatic in origin. A minute after the injection of the anæsthetic, the pulse became feeble, the respiration stopped, and the patient became deeply cyanosed. She however started breathing very soon after artificial respiration was commenced, and the operation was successfully completed. Her condition after the operation was quite satisfactory, though she was boisterous for some time. We attribute the untoward signs observed to the state of her heart, and we have no doubt that chloroform would have been even more dangerous in her case.

One case of appendicectomy had troublesome hiccough during the first five minutes of the operation, after administering 10 c.cm. of evipan, but it passed off, and the patient had good relaxation of the muscles for 20 minutes afterwards.

The simplicity of the administration of evipan sodium is its most attractive feature. Its greatest sphere of usefulness lies in operations of short duration. The most noticeable shortcoming of evipan is its tendency to cause a boisterous or even a violent condition of the

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TREATMENT OF ENLARGED SPLEENS WITH INJECTIONS OF MILK

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In the September 1932 number of the *Indian Medical Gazette*, Major B. H. Singh, I.M.S., noted that he had tried injections of milk in enlargement of the spleen due to malaria with amazingly good result. He tried this in enlargement of the spleen due to kala-azar, but the result was not as successful. In the January 1933 number of the *Indian Medical Gazette* D. A. Ganguli stated that these spleens would probably have been cured by the usual treatment without the injection; that the injection of milk has no effect whatsoever on the reduction of the size of chronically-enlarged spleens; and that probably Major Singh used milk in only recent enlargements and that is why he obtained such encouraging results which would not be the case in hard spleens of longer duration.

Being attracted by the results noted by Major Singh I have been trying the injection of milk in all cases of enlargement of spleen with the result noted below. The injection is given twice a week by 2 cubic centimetres at each subsequent injection up to 10 cubic centimetres at the fifth injection. If the spleen does not disappear under the costal arch after the fifth injection, i.e., after one course, another course is repeated after one month. Thus two or three courses are repeated sometimes in obstinate but improving cases. The milk is made fat-free by churning and the fat-free milk sterilized in a water-bath and cooled. The milk for injection is taken into the syringe from below the scum formed after cooling and the injection is given in the gluteal muscle.

I have so far treated 319 cases of which 80 have been discharged as cured. One hundred and forty-six cases received only one injection and did not return, consequently the results could not be noted. The outcome in 173 cases was noted to some extent; of those 173 cases 98 had soft spleens, 54 hard spleens and in 21 cases the consistency of the organ had not been

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patient after the operation. This we have observed in no less than a third of our cases. Its dangers are few while its advantages are many: but fuller clinical research is necessary before the value of sodium evipan can be fully assessed, and its name established as a standard anæsthetic.

I have to thank Lieutenant-Colonel R. F. D. MacGregor, I.M.S., Medical Officer, King Edward Memorial Hospital, who operated on the cases mentioned, for permission to publish this report, and for valuable advice and guidance.

noted. Eighty patients were discharged as cured; of 44 cases no data were recorded, while the remaining 49 cases (24 hard and 25 soft spleen) improved, but ceased to attend before they could be labelled as cured. Of the improved hard-spleen cases two were of ten years, one of six years, three of five years, two of two years, five of one year and others below one year's duration. The size of spleen in these cases ranged from three fingers to nine fingers below the costal arch.

Of the 80 cured cases there were 56 soft spleens, 18 hard spleens and of 6 cases the consistency of spleen had not been noted. Of the hard spleens one was five inches, of ten years' duration and cured in three injections only; one was six inches of six years' duration, cured in 14 injections in three courses; one was eight inches, cured with five injections; two were four inches of four years' duration each cured in four injections. The duration of the others was below one year. One—nine inches of five years' duration—has been slightly reduced and its stone-like hardness considerably softened after one course of five injections. This case is still under treatment and is expected to be cured.

As the patients were all outpatients coming from various distances they did not attend regularly for the injection as advised, consequently the result of the last injection could not be noted. Among the improved cases there must be many cured. In fact we detected on

enquiry three cases cured after the first injection only; all these three were cases of recent origin with small-sized spleens.

The conclusions at which I arrived as a result of my experience were as follows:—

(1) Enlargement of the spleen is reduced by intramuscular injection of fat-free milk.

(2) Milk injection is effective in enlargement of spleen due to malaria.

(3) In enlargement of spleen due to kala-azar, it has very little effect if any. I tried it in one case with four injections regularly but to no effect and the patient was subsequently treated and cured with neostibosan.

(4) Soft spleens are easily reduced in size with this treatment.

(5) The progress of improvement is slow in hard spleens. After the completion of one course of five injections a second or third course is sometimes required, a gap of one month being given between two courses.

(6) The longer the duration of the enlarged spleen the more the number of injections and the longer the time required for its cure.

My thanks are due to my compounders for their hearty co-operation in keeping the records of the injections and noting the results; otherwise it would not be possible for me to have studied the result of this cheap and easily-available medicine in the treatment of an ailment that is so common among the malaria-infected masses.

A Mirror of Hospital Practice

AN ENCOURAGING RESULT OBTAINED BY THE USE OF E. C. C. O.* IN THE EARLY STAGE OF LEPROSY—ANÆSTHETIC TYPE

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Z. N. N. of Hafflong, North Cachar Hills, life-sentence prisoner, aged about 38 years, of indifferent health, weighing 98 pounds, i.e., 8 pounds less than he should have normally weighed, was admitted into the jail hospital on the 18th October, 1932, for the treatment of balanitis, eczema of the scrotum and a superficial erythematous patch on the skin measuring 2 inches in diameter on the left side of the face over the malar prominence, the centre of which was of a brownish colour, shiny and anæsthetic, while the margins were hyperæsthetic. Neighbouring lymph glands were found enlarged to some extent. The patient in addition complained of headache, malaise and anorexia. A specimen of skin from the patch and blood serum were sent to the Shillong Pasteur Institute on the 22nd October. The report, received on the 7th November, was that lepra bacilli were found in masses in the deeper part of the skin and that the Wassermann reaction was negative.

Accordingly the patient was transferred to the leper ward of the jail hospital and was placed on E. C. C. O. and potassium iodide in increasing doses, while the general diet was improved by adding extra milk and fish.

Intramuscular injections of E. C. C. O. was commenced from the 7th November, 1932, at an interval of four days starting from $\frac{1}{2}$ c.cm. and gradually increasing by $\frac{1}{2}$ c.cm. to 5 c.cm. After receiving a total quantity of 113 cubic centimetres of E. C. C. O. the patient was attacked with bacillary dysentery on the 3rd April, 1933, and was treated with salines while the E. C. C. O. injections were stopped during the attack until the 15th April. The injections were again started from the 16th April and continued until the 30th August thereby giving in all 303 cubic centimetres to date. The injections were then stopped until the 5th September as the patient complained of pain all over the body and the site of injection was seen to be inflamed. As this subsided, the injections were again started from the 6th September and continued until the 24th September by which time he had received a total quantity of 328 cubic centimetres. As the patient complained however of vertigo and dizziness the injections were suspended. On the 10th October signs of inflammation were noticed on the right scapular region involving an area of 8 inches diameter which gradually developed into a large carbuncle which was excised on the 24th October, and had healed by the 28th November. The E. C. C. O. injections were again commenced on the 17th December, commencing with $\frac{1}{2}$ c.cm. and increasing the dose by $\frac{1}{2}$ c.cm. each week

* Ethyl ester of hydnocarpus with creosote camphor and olive oil.

until a maximum of 3 c.cm. was being given; the total amount administered up to the 21st January, 1934, was 338.5 cubic centimetres. After the above course of treatment, the patient was found to be totally cured of leprosy as the nasal smear showed no acid-fast bacilli and all other physical signs of leprosy had disappeared. The patient was kept under observation for a period of about two and a half months after the closure of the treatment in the event of a relapse but up to the present there has been none.

After disinfection he was discharged from the leper ward and allowed to mix with the ordinary prisoners of the jail, being given separate accommodation at night.

I am indebted to my Superintendent Captain R. A. Haythornthwaite, I.M.S., for rendering me timely instructions in treating this case and for permission to publish the result.

TWO CASES OF BILATERAL CERVICAL RIBS

By N. MANGESH RAO, M.B., C.M., F.R.C.S.

Surgeon

and

K. MANJUNATH RAO, M.B., B.S.

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Case 1—A Hindu female, aged 30, was admitted into the General Hospital, Madras, on 21st February, 1934, for neuralgic pains in the right arm of two and a half years' duration.

History—Two and half years ago, while bathing her child, she felt her right arm suddenly benumbed and powerless. With rest and massage she recovered. Some months later she noticed neuralgic pains in the limb after use. Latterly the pains had become worse and extended into the wrist and fingers, but relief was obtained by raising the arm to the side of the head. The pain was of a shooting type with pins-and-needles sensation and numbness. This has recently become persistent.

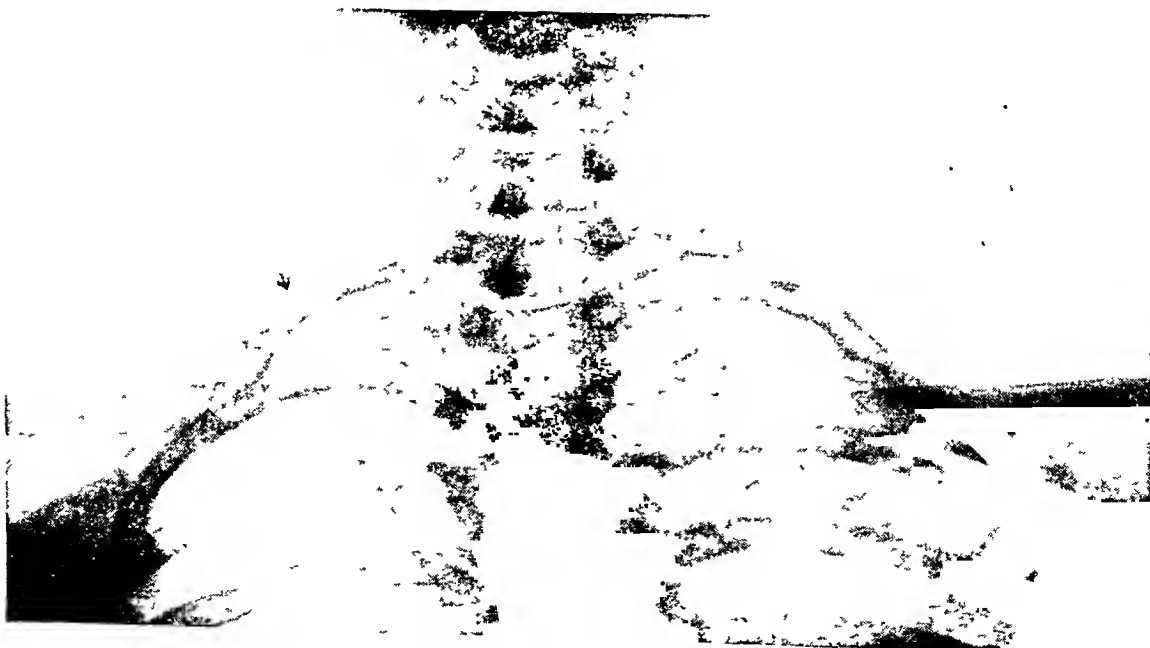
Condition on admission—A well-nourished young woman, rather fat but sturdy. Both shoulders and arms were of equal proportion with no wasting of muscles. The grips of both hands were equal. On examination a bony resistance could be felt on both sides of the root of the neck. There was no visible pulsation on either side. On the right side neither the brachial nor radial pulse could be felt. The blood pressure in the left arm was 105/70 but none could be made out on the right side. No wasting of the intrinsic muscles of the right hand was seen.

X-ray photographs showed bilateral cervical ribs of the third degree. On the right the cervical rib seemed to join the first rib just lateral to the scapular tubercle without any joint, but on the left a joint could be made out.

Operation—Through a collar incision the tendon of the scalenus anticus was exposed and a tenotomy of this tendon was done as advised by Adson. The pulse in the right brachial returned but was very feeble. After this the cervical rib was exposed by lifting the brachial plexus and the rib was excised subperiosteally as far as the transverse process of the seventh cervical vertebra. The periosteum was then snipped away. The brachial pulse improved but the radial one was not perceptible.

The wound healed by first intention. The radial pulse became perceptible on the third day after operation and steadily improved. All pain and tingling had ceased.

Comment.—The sudden onset was probably due to lifting the child while bathing it. The fact that only arterial pulsation was absent without any atrophy of muscles suggests that the pressure effects were mainly on the sympathetic nerve supply of the artery. The fact that the returned pulse was not as strong as on the opposite side is probably due to some intrinsic narrowing of the arteries from long-standing spasmodic contractions of the vessels. Adson advises simple tenotomy of the scalenus tendon, but in this case it did not improve the



Case 1—X-ray of bilateral cervical rib before operation.

pulse to any great extent until the rib was also removed.

Case 2.—A Hindu male, aged 43, was admitted on 4th April, 1934, for neuralgic pains shooting down the left arm and up into the neck, of two and a half years' duration.

arm to the side of the head was due to the subclavian artery being compressed between the raised clavicle and the cervical rib.

We are obliged to the Government X-ray Institute, Madras, for the roentgenograms.



Case 1.—X-ray of bilateral cervical rib after operation.

History.—The pain was first noticed two and a half years ago in the left side of the neck. Later it became neuralgic, shooting up into the neck and down the left arm. He felt the left arm easily fatigued and benumbed during the attacks.

On admission.—A well-built adult but not stout. A distinct swelling with visible pulsations was seen in the left supra-clavicular fossa. A bony mass could be felt under the subclavian artery. Pressure on these produced the neuralgic pains. There was no muscular wasting and the hand-grip was good. The radial pulse in the left arm was good with the arm hanging down but disappeared on lifting the arm to the side of the head.

The Wassermann reaction was positive. Roentgenograms showed a complete cervical rib on the right and one of third degree on the left. A joint could be made out between the cervical and the first thoracic rib.

After a course of anti-syphilitic treatment the patient was operated on and the left cervical rib was removed as far as the transverse process of the seventh cervical vertebra. The wound healed by first intention. The radial pulse was tested in both positions of the arms (hanging down and abducted to the side of the head) and was as good as on the opposite side. The neuralgic pains had ceased.

The patient was discharged after a full course of anti-syphilitic treatment.

Comment.—The unusual sign of disappearance of the radial pulse on abduction of the

EVIPAN SODIUM FOR SMALL OPERATIONS*

By S. C. GUHA ROY, L.M.F.

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THE writer's experience with this drug in minor surgery has been encouraging. It appears to be a suitable anæsthetic for use in small hospitals where there is often a lack of assistants. A short note is appended on the application of the drug in a simple case of mammary abscess.

A female coolie suffering from an abscess of the breast was put on the operating table without any preliminary treatment. A total of 5 cubic centimetres of evipan sodium was injected intravenously. After the first 2.5 cubic centimetres had been given the jaw relaxed and complete unconsciousness quickly followed. She regained consciousness nine minutes later by which time the operation had been completed. An hour later the patient felt quite normal.

My thanks are due to my chief Dr. E. Burke for his kind encouragement and permission to publish a note on this case and to Mr. T. Hassain for his able assistance.

*Rearranged by Editor.

Indian Medical Gazette

DECEMBER

THE INDIAN RESEARCH FUND ASSOCIATION

THE Indian Research Fund Association is not only the most important medical research organization in India but it is also the oldest organization of its kind in the British Empire, the Medical Research Council of Great Britain, which was formed during the Great War, being about five years younger. Although this Association will shortly be entering upon its twenty-fifth year of existence, there is still a surprisingly large number of medical men in India who appear to be entirely ignorant of its functions and achievements.

It is the obvious duty of every medical man to maintain an interest in medical research work, even if his routine duties prevent him from taking an active part in it himself; further it is also his duty to interest and to help to educate the general public in this subject, as not only do we rely on the financial support from public funds for the maintenance of the organizations that carry out this work, but the active and intelligent co-operation of the general public is often essential for the successful execution of a research scheme. In these circumstances we feel that it will not be out of place to give a short account of the origin and aims of the Indian Research Fund Association and of the procedure that is adopted in the administration of its funds.

One of the earliest organized investigations into any medical problem in India was the Plague Commission. This Commission was formed in 1903 partly by members of the Indian Medical Service and partly by scientists recruited in Europe. When its main purpose, the demonstration of the transmission cycle of plague, had been fulfilled, the Government of India realized the desirability of having a permanent body of men to continue the work of this Commission and ready to undertake other investigations of this nature when occasion arose; therefore in 1908 they constituted the Bacteriological Department—which has now been more appropriately renamed the Medical Research Department—and three years later they initiated an epoch for medical research in India of almost complete freedom from the governmental system of administration and control. They founded and liberally endowed the Indian Research Fund Association. This Association which was controlled by a Governing Body was permitted to spend its annual income for medical research in whatever way it thought best, and was also permitted to use the Central

Government's existing bacteriological staff and its Central Research Institute for the better organization and conduct of its activities. The defined object of the Government of India in creating this Association was to prosecute and assist researches in tropical diseases and also to carry out experimental work generally in connection with the causation, mode of spread and prevention of sickness and disease in India.

It was anticipated that Government would continue their annual contributions for research and salaries of officers in the Medical Research Department, but on the recommendation of the Incheape Retrenchment Committee their grants were wholly discontinued from 1923 to 1924. The Government grants had enabled the Association not only to finance researches on various problems but to accumulate funds specifically for the purpose of founding an Imperial Medical Research Institute.

The income derived from these accumulated funds helped to tide the Association over the years following the acceptance of the Incheape Committee's recommendations but the annual Government grant was later restored, partially in 1926-27, and fully in 1928-29. As a result of the general economy campaign, from 1932-33 the annual Government grant to the Association has again been discontinued—that is to say it has been reduced to one and a half lakhs, a sum which barely covers the pay and allowances of the permanent members of the Research Department temporarily employed by the Association—and it cannot be said if and when it will be restored. In order to balance the budget, and at the same time to maintain as far as possible all major enquiries in India, and to keep in employment the large body of specially-trained men, many of whom have been working for a number of years, the Association have since that year been drawing from its accumulated funds three to four lakhs a year. The question of establishing the Imperial Medical Research Institute has now been postponed by Government indefinitely, but during 1932-33 and 1933-34 the Association has contributed Rs. 2,11,000 towards the cost of additions and alterations to the buildings of the Central Research Institute, Kasauli, from these accumulated funds.

Besides financing investigations which are being conducted by workers in its direct employment, the Association gives grants-in-aid to outside institutions and also to outside workers. Its expenditure upon various medical research problems has for the last few years approximated to about eight or nine lakhs of rupees per annum. The Association supports the Malaria Survey of India and it contributes substantially towards the cost of the kala-azar enquiry at Calcutta, which has been at work for the last ten years. It also entirely finances the researches on nutritional diseases at the Pasteur Institute of Southern India, Coonoor,

as well as other enquiries on plague, cholera, skin diseases, indigenous drugs, tuberculosis, malaria, cholera bacteriophage, etc., etc., throughout India. The results of these investigations are published in the *Indian Journal of Medical Research* and its *Memoirs*, the *Records of the Malaria Survey of India* and the annual report of the Scientific Advisory Board issued under the authority of the Association. The Association has its own library and stores at Kasauli, and encourages medical research in all possible ways. It is particularly desirous of encouraging junior workers to take up medical research in different branches and it employs a large number of skilled workers of different classes, such as bacteriologists, chemists, biochemists, entomologists, etc.

At present the formation of a junior cadre in order to encourage young scientists to enter the field of medical research is under consideration.

The Governing Body of the Association was until 1927 composed exclusively of officials, but in that year the Raja of Parlakimedi, having made the munificent donation of Rs. 1,00,000 to the Association, was appointed a life member.

The rules of the Association provide for the membership of private individuals who contribute thus to its funds, but up to the present this is the only occasion on which advantage has been taken of this rule. It is to be hoped that this will not long remain an isolated example of the interest of a philanthropist in the activities of the Association.

In 1929, the Government of India took into consideration the question of liberalizing the constitution of the Governing Body and finally decided to enlarge that body by the inclusion of three representatives of the Indian Legislatures, two representatives of Medical Faculties of Universities incorporated by law in India and one eminent non-medical scientist to be nominated by the Governor-General. As a result of further representations from the Universities and the Legislatures, the Governing Body of the Association was again enlarged in 1933 by the addition of one further representative of the Medical Faculties of Indian Universities, making three in all, whilst it was decided that the non-medical scientist should in future be elected by the Indian Science Congress. The Director of the Malaria Survey of India, Kasauli, was replaced by the Director, School of Tropical Medicine, Calcutta.

The Governing Body appoints its own Scientific Advisory Board who examine all proposals in connection with the scientific objects of the Association before submitting them to the Governing Body for approval. The ten members of the Board are appointed for one year but are eligible for re-election. The Scientific Advisory Board consists of scientific men of high standing in India, e.g., the directors of all the chief laboratories in

India; the Director-General, Indian Medical Service, is chairman and the Public Health Commissioner with the Government of India is secretary.

In order to ensure the closest co-operation between workers and to prevent overlapping of effort an annual conference of all medical research workers is convened in Calcutta towards the end of each calendar year and at this conference free discussion is held on the work accomplished and on proposals for future work.

Although this conference has no executive power, it has in the past exerted an important liberalizing influence on the conduct and management of the Association. Individual scientists are enabled to put their cases for the initiation or for the continuation of their enquiries before fellow scientists, and to hear their criticisms or to receive their support. In the past the Scientific Advisory Board, and thus indirectly the Governing Body, have been very largely influenced by the tone of the discussions at this conference.

THE CHRONIC PRIMARY GLAUCOMAS

ONE of the outstanding problems in ophthalmology to-day is the elucidation of aetiological factors in the primary glaucomas, i.e., those not directly resulting from obvious pathological or anatomical defects of the eye. Our knowledge of the mechanisms productive of intraocular hypertension in such cases has been greatly augmented in recent years by the publications of Duke-Elder, Seidel, Magitot, Meesmann, Thiel and others. That increased tension may be due to a disturbance of the physico-chemical equilibrium between the uveal capillary blood on the one hand and the intraocular fluid (largely contained in the vitreous body) on the other, may seem a satisfactory hypothesis in certain types of cases. In others an increase in volume of the intraocular vascular bed may offer a very good reason for hypertension and the displacement of the vitreous body. The action of abnormal intraocular chemical bodies on the physical condition of the vitreous gel may result in an increased volume of the posterior segment, and the safety valve mechanism of the filtration angle which at first copes with this vitreous swelling may be thrown out of action by the encroachment on the anterior chamber. This conception too seems to adapt itself to clinical appearances which are all too familiar to ophthalmologists in India. In the case of glaucoma simplex in relatively young subjects, with an anterior chamber of normal depth, a slight or marked, constant or intermittent, rise in tension, extensive cupping of the disc, and a field depressed towards vanishing point, no very satisfying explanation is available.

However interesting the speculations and proven facts in connection with the intraocular chemical, physical, and electrical conditions may be, and however valuable in helping us to frame rational hypotheses with regard to intraocular hypertension, we are still in almost complete ignorance of the essential origins of such local changes, although it is hardly likely that we can disassociate them from generalized phenomena of a similar nature throughout the body due to the same original causes. In other words it is difficult to think of a chronic primary glaucoma as anything more than a local expression in a peculiar anatomical field of a generalized disorder of unknown origin. If this be so, it may be possible for those who have the opportunity of dealing with primary glaucoma in bulk to throw some light on its ætiology by observing associated signs and symptoms of defective function in other parts of the body which are more accessible to ordinary methods of investigation than the eye. To confine the enquiry into the ætiology of primary glaucoma to the level of the eye is equivalent to limiting the investigation of chronic Bright's disease to the level of the kidney. Clinical observers in India who see large numbers of primary glaucoma cases frequently ask themselves, to what generalized disorders or syndromes does this glaucoma complex belong? What are the noxious influences at work? Are they as insidious in their action and as elusive in their isolation as some of the noxious agents which produce extensive changes in the peripheral arterial tree, e.g., the arterioscleroses? It is quite possible that this is so in some of the chronic primary glaucomas, and that our ætiological search may merely refer us further back to the vague and unsatisfactory region in which we visualize a summation of injuries to the delicate mechanisms of the body which depend on a healthy capillary wall, inflicted by all manner of toxæmias of greater or lesser degree recurring again and again through life.

Fortunately, there is at least one condition which gives us a definite lead in attempting to solve the problem of ætiology, namely, epidemic dropsy. Here we have a generalized disorder associated with the ingestion of a certain type of rice manifesting itself in definite outbreaks, by a toxæmic action on the peripheral vessels productive of dropsy (amongst other pathological changes). One speaks of outbreaks rather than epidemics as the latter term is perhaps a misnomer in this condition. One of the features of this disease is primary glaucoma of a relatively slow non-congestive onset. It stands apart as an isolated example of a clinical combination asking for further investigation; it places primary glaucoma in its proper environment, a symptom-complex of a disease of known ætiology. Calcutta workers have made the study of epidemic dropsy peculiarly their own. They have described it clinically, defined its

toxæmic nature, investigated certain of the associated histopathological changes, and noted the fact—of such vast possibilities to the ophthalmologist—that glaucoma is one of its clinical manifestations. More important still Col. Kirwan has observed during an outbreak that glaucoma may be the first isolated manifestation of this toxæmia. This is surely a significant observation, and Calcutta, so powerfully organized for co-ordinated research, should not let the matter rest here. We feel confident that they will follow up their lead by further investigation which may in time enable us to recognize other provocative agents of this malady so productive of blindness in India amongst the middle-aged and aged, and, armed with this knowledge, forestall it by preventive measures. To quote Col. Kirwan (*Arch. Ophthalmology*, 1934, Vol. XII, p. 1),* 'This subject presents a large field for experimental work and if it is carried out one can look forward to the day when a great part of the problem of glaucoma will be solved by therapeutic measures or methods of prevention'.

R. E. WRIGHT.

*Vide our Current Topics section, p. 702.—EDITOR.
I. M. G.

Special Articles

TREATMENT OF OPIUM POISONING

By ATINDRA NATH SEN, M.B.

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OPIUM is very commonly used in Bengal in suicide and the general practitioner has to meet with such cases off and on in his practice. Of all poisoning cases reported, nearly 60 per cent are due to opium. For the purpose of treatment, I divide my cases into three groups:—

(1) Patients conscious, brought immediately after the poison was swallowed, (2) patients brought in a drowsy condition, and (3) those brought in a comatose condition.

In the Campbell Hospital I receive my cases mostly in the comatose state.

The main principles of treatment are based on:—

(1) *Elimination*.—(a) Stomach tube, (b) emetics, (c) purgatives, (d) high colon wash, and (e) diuretics.

(2) *Prevention of action or of absorption*.—(a) emetics and purgatives, (b) permanganate and other oxidizing agents, and (c) substance that will form insoluble compounds.

(3) *Counteraction of effects*.—(a) Stimulate respiration, (b) stimulate heart and circulation, (c) counteract narcosis, (d) reduce the poison in the blood, and (e) preserve the body heat.

I evacuate the contents of the stomach with a stomach tube at once, using plain warm water

and save the washings for chemical analysis. I have observed, in post-mortem examinations, lumps of opium stuck to the wall of the stomach with mucus, though repeated gastric lavage with permanganate lotion has been given. Therefore, as a routine, I now administer a second stomach wash with sodium bicarbonate solution, two teaspoonfuls to a pint of water, allowing sufficient time (three or four minutes) for the mucus to dissolve and the opium to become disentangled. Lastly, I wash out the stomach repeatedly with potassium permanganate solution, not exceeding a pint and a half each time, in strengths of five grains to a pint as long as the return wash comes out decolorized. A grain of morphine (roughly ten grains of opium) is oxidized by a grain of potassium permanganate, but in a poisoning case there are other organic matters which are oxidized also. The permanganate solution wash is repeated at intervals of two hours. If crude opium is taken, dilute acetic, hydrochloric or sulphuric acid is administered with the wash to convert the morphine alkaloid to a salt. After washing out the stomach I always leave behind in it a pint of hot strong coffee, and also give this amount per rectum every two hours, following a colon wash.

If a stomach tube is not available emetics are useful in the first group of cases, they may be so in the second, but when the medullary centres are depressed, as in the third group, they are harmful and useless.

Apomorphine hydrochloride, a tenth of a grain, is injected subcutaneously and with failure may be repeated within 15 minutes; but, whenever emetics of any kind are given, large draughts of water must be administered beforehand to get a really effective wash-out. The next best choice is zinc sulphate, failing which, in an emergency, I use mustard, one tablespoonful, or common salt, a teaspoonful in a cup of warm water, followed by tickling of the throat with the fingers.

As a purgative I always prefer saturated solution of magnesium sulphate, and repeat it, if necessary, after the preliminary stomach wash.

A high colon wash is given in all cases every two hours, but it must be given slowly. Diuretics, such as sodium citrate, potassium citrate, and spiritus etheris nitrosi, are started as soon as the patient is able to swallow them himself. Otherwise, I give caffeine sodium benzoate ($7\frac{1}{2}$ grains), an injection every six hours, and apply hot fomentation or electric bath over the loins.

The next and the most important part of the treatment is to antagonize the action of opium. Atropine is the drug for this and we must know what is the best dose to start with.

(a) Atropine sulphate is injected, an initial dose of $1/20$ th grain which is repeated every half an hour to two hours, watching its effect on the

number and character of the respirations. Small doses are of no value and I am very definite about high doses being well tolerated. On an average for a total cure, I inject $1/8$ th grain during a period of 12 hours; the maximum total dose injected was $1/7$ th grain in about 16 hours. I tried this in seven cases and I lost only one of these.

For asphyxia, oxygen is applied early and artificial respiration is resorted to if necessary.

(b) To keep up the heart and circulation I use strychnine sulphate, $1/30$ th grain, by injection every two hours up to three doses, if required. Caffein, cardiosol, camphor in ether, etc., are regularly given.

(c) To combat narcosis, I use caffeine sodium benzoate injections and flap the nose and face with hot moist towels. I never allow the patient to be exhausted by being made to walk up and down the room. Strong solution of hot coffee by the mouth or rectum is useful in this connection.

(d) To reduce the poison in the circulating blood, I strongly advise venesection, specially when the patient is cyanosed and has a feeble pulse. Fifteen ounces of blood at once, to relieve the congested heart, should be drawn out and the loss should be replenished by normal saline solution given subcutaneously. To guard against the fall of blood pressure adrenalin chloride solution should be given by mouth. I found atropine and strychnine, injected subcutaneously after venesection, increase the immediate good effect. I am so convinced of the efficacy of venesection that I feel that I should probably not have lost my case 4 (*vide infra*) had this been done.

Case 1.—C. C., Anglo-Indian male, aged 28 years, took half a tola of opium on an empty stomach at 2 p.m.; admitted same day at 6 p.m.; drowsy, contracted pupils, pulse—62, and respiration—12 per minute, breathing shallow, and face livid.

Stomach wash, coffee, etc., given. Apomorphine, $1/10$ th grain, acted in two minutes. Total atropine injected in five doses was 16 tablets of $1/150$ th grain each in 14 hours, that is, $1/9$ th grain.

The patient discharged cured after two days.

Case 2.—K. S., Indian Chinese female, aged 32 years, took one tola of opium but vomited. She again took the same amount at 7 a.m. on the 20th May, 1932; admitted at 4.45 p.m. same day—semi-comatose, pupils contracted, pulse—65, respiration—10, cyanosed.

Stomach wash, etc., given. Apomorphine acted after two injections. Total atropine injected was 10 tablets of $1/150$ th grain each, that is, $1/15$ th of a grain in nine hours. Discharged cured on 22nd May.

Case 3.—A. D., Hindu female, aged 24 years, took half a tola of opium with milk in the evening of the 23rd July, 1932. Admitted at 1.30 a.m. on the 24th July; comatose, conjunctival reflex lost, pulse—100, respiration—8, pin-point pupils, face livid, cold clammy skin, and shallow breathing.

The usual stomach wash, etc., given with simultaneous injection of atropine. Total atropine used was 19 tablets of $1/150$ th grain each, that is, $1/8$ th grain in nine hours. Patient was discharged cured on the 25th July.

Case 4.—H., Mahomedan male, aged 27 years, quantity of opium taken was unknown. Took opium at 12 noon and was admitted at 7.20 p.m. on the same

day. Pin-point pupils, deep coma, stertorous shallow breathing, pulse—120, respiration—12, and face, lips and fingers all blue. Half a tola of opium was brought out with stomach wash; atropine and strychnine, oxygen, etc., were given; venesection was not done.

The patient expired at 11-45 p.m.

Total atropine injected was 20 tablets of 1/150th grain each, that is, 1/7th of a grain in three hours but without any effect.

Case 5.—S. G., Hindu male, aged 22 years, took a quarter tola of opium at midnight. Admitted the following day at 11 a.m., drowsy, pulse—84, respiration—12, shallow breathing.

Total atropine injected was 1/12th grain in 20 hours. Discharged cured three days later.

Case 6.—K., Hindu male, aged 40 years, took crude opium, quarter tola, on an empty stomach. Pulse—125, respiration—12.

After stomach wash became cyanosed and comatose in two hours. Strychnine 1/30th grain injected three times every two hours.

Total atropine given was 1/7th grain in 12 hours. Patient improved considerably after venesection was done followed by injection of atropine and strychnine. Discharged cured.

Case 7.—J. S., Hindu male, aged 23 years; quantity of opium taken not known. Admitted at 3 p.m., comatose, pulse—96, respiration—18. Pin-point pupils, cyanosed, breathing shallow.

Total atropine given was 1/10th grain in eight hours; and three injections of strychnine, 1/30th grain each; venesection was not required. Discharged cured three days later.

DEVELOPMENT OF HEALTH EDUCATION WORK IN THE UNITED PROVINCES

By A. HAMID, B.Sc., M.B., B.S., D.P.H., R.C.P.S. (Eng.)
Assistant Director of Public Health, Hygiene Publicity Bureau, U. P., and Honorary Secretary, Provincial Branch, Indian Red Cross Society

THE need of a permanent organization for the improvement of health conditions of the rural masses has assumed considerable importance in all countries of the world. In India the rural masses constitute the bulk of the population and provide the greater part of the revenues of the State. Agriculture being the principal industry of the country and having a close interaction with individual health it is of the utmost importance that the health of the rural masses should be safeguarded. Some of the Indian States, *viz.* Mysore and Travancore, which have realized the importance of this matter and the economic value of keeping the rural population fit, have initiated measures of improvement. Several others are considering proposals for the improvement of the health of their subjects.

Public health work is intimately connected with various other schemes of welfare and in this article an attempt has been made to indicate the lines of development of the health education work in the rural areas of the United Provinces.

Various schemes for the improvement of rural conditions have been formulated and introduced in different parts of India. They have almost all been started with the idea of improving the condition of the masses by providing elaborate establishments from the start. In the United Provinces the aim has been

to improve the conditions by health education. Health, wealth and education go hand in hand and are interdependent and any uplift work will be found to be productive in the long run only if it is based on sound education. 'Uplift' is only a synonym for education. In the opinion of experts 'the health authorities should strive to spread the knowledge of hygiene by every available means as one of the most effective and economic methods of rural sanitation' (Health Organization, League of Nations).

With this principle in view the hygiene publicity bureau was established about twelve years ago and considerable attention has since been paid to *propaganda* among the masses on the occasion of fairs which are numerous in these provinces, *publicity* among selected groups of people like teachers and the education of the school-going population. The evolution of these activities has shown a tendency towards specialization, and the importance of health education has been fully established.

Propaganda work for the masses has done considerable service during the prevalence of the three major epidemics of cholera, plague and smallpox. The older people have their prejudices ingrained and it is not an easy affair to wean them of their ideas. It was therefore found expedient to train the village schoolboy in the simple rules of health as his mind was impressionable. Education in health is really a task of generations and it is not expected to show striking results for the admiration of the superficial observer in a short time. In fact no welfare work should be started which is likely to be short-lived; nor is the work interesting from the doctor's point of view if he has a tendency to limit himself to a routine existence. He must work with the spirit of a missionary, and it is a doctor who is well fitted to live in love and charity with his neighbours and to do good to the people.

One of the peace-time activities of the Red Cross Society is popular health education, and the Indian Red Cross Society found in the public health department of these provinces an agency which could carry out these activities to the best advantage. Funds for material for doing the work have been provided by the Red Cross and a well-trained personnel, distributed in the districts, by the public health department. This is an example of collaboration between health authorities and an unofficial health organization which is of greatest value in the interest of economy and efficiency.

A large number of illustrated posters, booklets and leaflets have been prepared, also light portable models have been made. All medical officers of health in urban and rural areas have been supplied with magic lanterns and slides on various health subjects. Each subject is explained by a story that will appeal to the public. Gradually the equipment has been developed, and now the bureau is in possession

of a number of health cinema films which have been prepared entirely by its own staff of producers, who have written the scenarios, laid out the scenes, photographed them and prepared the positives. There is a motor van in which the models are fitted, and a generator and a projector with films are taken about as a mobile health demonstration unit. Locally in the districts a mobile museum consisting of models has gained access in bullock-carts to those places where the motor van cannot reach. A set of public addresses (loud-speakers) also forms part of the equipment of the hygiene publicity bureau and it is used to amplify lectures with and without the show of films. A recent addition in the motor van is a wireless receiver which has been used at rural fairs to receive health lectures which were broadcasted from the Lucknow University station. It will thus be noticed that the bureau has been well equipped with appliances for imparting health education in all its forms.

Of all these articles the magic lantern has proved to be the strongest weapon in the hands of the district health officers in combating epidemics and in enforcing hygienic measures at all times. The lantern is therefore recommended as a very useful means of *propaganda* in the crude form of a 'tamasha', *delimited publicity* or *health education* in schools, and there is a simple device to work it in broad daylight as well, using the sun as a heliostat. Of course, the success of the lantern lectures will depend on the lecturer's abilities in the work.

With a view to imparting these talents the staff of medical men with public health qualifications, the sanitary inspectors and health visitors are all given a sound grounding in the methods of working so that their angle of vision may be properly adjusted. A public health worker is like an 'emulsion' of many qualities. He must have some medical qualification, he must be conversant with the principles and practice of sanitary laws and laws in general, he must know enough of sanitary engineering to understand common constructional problems, and he must understand enough of politics, without indulging in them, to be able to deal with local bodies. But he becomes like a clear 'mixture' only if he can develop the qualifications of the teacher. The training of these talents of teaching for which the doctor is well fitted has therefore been particularly emphasized by the public health department in these provinces.

The *district health scheme* of these provinces was at first introduced in three districts which were notorious for epidemics, and it has been gradually extended to 30 out of a total of 48. Under the scheme a skeleton organization consisting of one district medical officer of health with an assistant and a sanitary inspector for each tahsil with a gang of six labourers in each

has been posted. The duties consist of inspection of vaccination, inspection of registration of births and deaths, correction of vital statistics, general supervision and inspection of sanitation, inspection of scholars specially in middle and primary schools, supervision of sanitation at religious fairs and other gatherings, supervision and regular inspection of the travelling dispensaries, hygiene propaganda and control of epidemics.

This small staff in a district of at least 2,000 villages is much too meagre to show many results and it is to its credit that it is able at least to suppress the outbreaks of epidemics. It is also to the credit of the workers that the financial stringency did not materially affect the scheme although the public health budget had to be reduced by 33 per cent. The success of the work has been due to the educational work done, specially in the combating of epidemics. Not that all the epidemics have been banished, but it is certain that these outbreaks have not the same devastating results now as they used to have before. All anti-epidemic measures are peacefully enforced and accepted under the influence of that teaching in which the staff has become an adept.

Out of the crude scheme gradually evolved the *village aid scheme* under which each sanitary inspector selected for intensive work groups off half a dozen villages which he could visit frequently. This number was gradually increased and the intensity of the work in them depended upon the conditions of epidemics in each tahsil. It was by persuasion that each family dug its own pit for the daily dumping of rubbish and manure, the labour gang made only demonstration pits in the beginning and it was seen that the cultivator followed the instruction. The practice of keeping all manure in front or inside the homes or close to the wells has entirely been given up in these villages. The use of the pits for calls of nature militated against the æsthetic sense of the cultivator, but he took to the distant fields away from habitations without hesitation. The sympathies of the headman or one or two prominent men of the village were at first enlisted; he became a sort of sanitary scoutmaster in setting an example to others and thus enforcing the unwritten by-laws. Soakage pits for household waste water was another useful device which the cultivators adopted, and they adopted them willingly when they were taught their value as a device for securing drainage and reducing the breeding grounds for mosquitoes. They raised parapets on their wells to prevent the grosser pollution of their drinking water from outside. After all it did not prove an expensive affair, as they were made to understand that the small parapet was more important than the platform and that a *katcha* well could be protected by raising a *katcha* parapet. Bathing and washing over the wells were thus stopped. The sanitary scoutmaster

was given a small village aid dispensary box as an anti-epidemic first-aid appliance in order to be able to render first aid in epidemics, thus popularizing the use of quinine, cinchona, essential oils and potassium permanganate, but to popularize this box a few harmless drugs of the pharmacopœia were added which the villager would in any case take in some form or other from the local grocer in the event of common ailments. This box at once raised the sanitary scoutmaster in the estimation of his compatriots and he readily learnt how to render first aid in common accidents as well. The duty of reporting in the event of epidemics and collection of vital statistics naturally fell upon him. This is another instance of co-operation with unofficials which the public health department secured by establishing a contact with the rural population. Clean midwifery was also introduced by making the village *dai* adopt the simple rules of cleanliness in her practice, but mere lessons for her could not be counted upon, as it was the householder in each case who was taught to demand the clean method.

These were only half measures and most imperfect from the scientific standpoint but they were tolerated in order to raise a sanitary conscience under very adverse financial and social circumstances and they proved successful inasmuch as the villages of the village-aid scheme have seldom been visited by cholera and plague, while these diseases have been raging in the vicinity and while these very villages used to be the starting point of the diseases in previous years. The rat epizootic was checked at its beginning by the exposure to the sun of all household effects. Thus the village aid scheme, delimited in extent though it was, was evolved from the crude district health scheme and was based on education.

Gradually it was found that the school teacher in the village, who was the most literate man, was a more suitable person as a sanitary scoutmaster, and through him the schoolboy could be given all health education. Thus the village school became a centre for village reconstruction work. The school as a whole became a member of the Red Cross, paying a nominal registration fee annually, and formed groups for various health activities which were taken up under the guidance of a teacher who was called the counsellor. In other words the sanitary scoutmaster became the counsellor whose field of vision became broader and activities specialized. He now possessed an internationally recognized title and took pride in guiding the children in the preparation of scrap books which were exchanged with similar Junior Red Cross groups in Europe, America and Japan, as messages of friendliness. The education department encouraged the Junior Red Cross movement and rewarded the teachers by giving certificates of honour. But their energies were

mostly concentrated on organizing the practice of health habits in schools in the shape of tooth cleaning, nail paring, body and clothes washing parades. First aid in sanitation, epidemics and common accidents received a great stimulus and the Mackenzie school course in these subjects, introduced by the Director of Public Instruction and named after him, became popular. Teachers who are holders of the first-aid certificate of the St. John Ambulance Association are permitted to give the training to school children in the Mackenzie school course, but they are tested for certificates by the medical officers of the public health department.

The counsellors exercised their talents by engaging their boys in songs, lectures, debates, dramas, dialogues, poster making, essay writing, model making, competitions and exhibitions on health and hygiene. Vague lessons on hygiene thus took on a concrete shape and the scheme led to the introduction of health education of the right type in villages with the district health staff to direct the energies into the right channel. The value of light and air is now better understood by the village boy and he avoids mouth breathing too. His behaviour is very unlike that of the town schoolboy whose book knowledge of the advantages of sun, light and air once prompted him to open his mouth towards the sun and take deep breaths. Teachers are liable to go astray in health education work either on account of diffidence or excess of zeal and the district health staff is there to direct them. The district health officer is invariably the secretary of the District Red Cross branch and the deputy inspector of schools in the district is often the secretary of the junior section of the district branch. The health department and the education department thus work hand in hand in imparting health education. Incidentally these interesting activities have kept the teachers and the schoolboys engaged during their spare time and thus kept them out of the path of mischiefmongers. The amount of village improvement work which they have done can be judged from the following summary of activities in one place :

'In 1933 the Junior Red Cross groups in one district prepared in all 772 posters and 307 poems on health, and they carried out an immense amount of health propaganda, giving 981 lectures and preparing 305 dramas and 406 dialogues. They filled up 257 depressions on the approach roads and made 72 culverts. They made sanitary improvements in 17 wells and prepared 177 soakage pits. They put up 6 model wells at a cost of Rs. 1,800. They fought fire in 45 cases, saved five persons from drowning and treated 5 cases of snake-bite. They helped the health staff at vaccination against smallpox in 12 villages, at cholera inoculations in 6 villages and at plague inoculation in 8 villages'.

Rural reconstruction or village improvement work is not an isolated subject. Health education has a wide scope and is more interesting as it affects personal welfare directly. Open air exercises and gardening also come on the programme of practical health education. There are two other departments which are closely concerned with village improvement work; they are the agriculture and the co-operative department. Their themes are of a specialized nature and by co-ordinating the activities of the health department interest has been infused in the combined effort at village welfare work so far as agriculture and co-operation are also concerned.

The public health requirements of larger municipalities where funds from taxation are forthcoming are of a definite nature, the village aid scheme is suited for the smaller villages where only limited resources are available and one has to feel contented with the little that can be done. But the amenities enjoyed by larger municipalities can to a great extent be given in a modified form to the larger villages and smaller towns at a moderate cost under what has been termed the *health unit scheme*. One such unit has been introduced into these provinces with the assistance of the International Health Section of the Rockefeller Foundation. This work again is based on health education, and from the evolutionary point of view can well be considered to be the highest type of public health reform in rural areas. Public health is purchasable and it may be taken as an axiom that unless one anna is spent per head per month by the community on public health administration it is not entitled to the commodity. This may restrict the health unit scheme to semi-rural areas, and it is here that the need of such reforms is very great indeed. It is here that the bored-hole latrine of the correct type serves as an inexpensive and inoffensive septic tank which can be installed literally next to the kitchen, as no scavenging or trenching is needed. It must of course be 50 feet from a well and then it is certain that there will be no bacterial pollution of the sub-soil water. There can be no better device for the prevention of intestinal infections, both bacterial and helminthic, in places where bare-footed cultivators have to wade through mud. As regards well improvement the parapet does prevent flood water contamination of a well but the bottom of individual buckets carries much filth inside the well. Small steel hand Persian wheels are fitted on wells which have been completely covered to ensure a safe water supply. But the most important aspect of the health unit work is a trained maternity service to a degree which is sufficient to secure all normal births in the area. This is the hardest part of health education where conservatism is to be 'broken' by house-to-house visits and at clinics. Demonstrations for mothers and 'little

mothers', attention to a few minor ailments only, and the presence of a doctor at the clinic go a long way in popularizing the trained midwife in rural areas. The health education programme in schools is on the same lines as already explained under the activities of the Junior Red Cross.

The health unit is thus an intensive measure of health work which is particularly suited to the rural population and the unit also serves as a training ground for the public health staff, and this is yet another aspect of health education. A well-trained staff who started the work with house-to-house survey is available here for all kinds of experimentation. Conversion of night-soil and rubbish into an inoffensive rich manure, called 'compost', is one in view which promises to be an excellent method of disposal of human and municipal wastes in towns at an expense which is well within their means.

In conclusion it may be said that the success of all health work depends upon how the staff takes to it, and, there being no allurements for private practice, the public health staff can devote its energies in the right spirit to the task of the amelioration of the conditions of their own people. In order to judge the progress made in these provinces a comparison of the districts under the district health scheme with those where there is no health staff will convince even a superficial observer of the amount and quality of uplift work which has been done in the former as a result of the education in health.

Medical News

THE INTERNATIONAL MALARIA COURSES FOR THE FAR EAST

IN India little attention has so far been paid to these international malaria courses organized by the League of Nations, Eastern Bureau. We say 'courses', because, although only one course has so far been held, it is the intention of the organizers to hold them from time to time as long as they remain popular and appear to be fulfilling the object for which they were originated. We are not sure where the responsibility for this lack of attention lies—whether insufficient publicity has been given to them, or whether we in India have been a little slow to appreciate their importance; the fact remains that only one representative from British India attended the course that was held at Singapore last year, this representative being sent by the Madras Government. There were however two representatives from Indian States.

One criticism we heard, namely, that we do not have to go from India to Malaya in order to be taught how to deal with malaria, shows the existence of a misconception regarding the aims and nature of these malaria courses and of a parochial vision, which it is one of their main objects to widen.

Singapore has been chosen as the venue for these courses, for a number of very sound reasons, namely, that it is a central port and most easily accessible to the representatives of all far eastern countries;

that Singapore is a large town with a large medical college, where there are excellent laboratory facilities,

and with plenty of comfortable accommodation for delegates and lecturers from other countries;

that Malaya is a country where the prevention of malaria has been tackled whole-heartedly, so that practical field demonstration can be given almost anywhere in the peninsula. Though there are probably few places in India that present exactly the same problems susceptible to the same solution, as those of Malaya, this is true of any part of the world, malaria being an essentially local problem. It is not by adhering only to methods already in vogue in one's own country, or by imitating slavishly the measures adopted in any one other country, but by studying the methods of all other countries and applying those most suitable to local conditions that the maximum success in malaria control can be achieved;

and, finally, that Singapore is situated in a country where the government is sufficiently broad-minded to appreciate the value of such a course to itself, as well as to other countries, and sufficiently generous to place, at the disposal of the League for the purpose of this course, its medical college laboratories and equipment and the valuable time of its medical officers.

Those mainly responsible for the organization of the first course were Dr. M. Ciuca, Acting Director of the Eastern Bureau of the League of Nations' Health Organization, Dr. R. D. Fitzgerald, Director of the Medical and Health Services, Straits Settlements, and Dr. G. V. Allen, Principal, King Edward VII College of Medicine, Singapore.

Dr. Park, the Director of the Eastern Bureau, has kindly provided us with details of this first course, which we give almost *in extenso* in order that the scope and importance of these malaria courses may be better appreciated in India. We understand that it is his intention to organize a second course next year, much on the same lines as the first but with the few modifications indicated below, which it is hoped will extend its usefulness.

INTERNATIONAL MALARIA COURSE, 1934

THE first International Malaria Course for the Far East was held under the auspices of the League of Nations in April, May and June, 1934. The first part of the course consisted of a theoretical and laboratory study of malaria, combined with demonstrations in the field of certain methods of control, and was held in the King Edward VII College of Medicine, Singapore, and the urban and rural areas of Singapore Island and Johore, commencing on the 30th April, 1934, and extending over a period of five weeks. This was followed by field courses in the Netherlands East Indies and Malaya. These field courses were held simultaneously, the delegates being divided into two groups. The field course in Java commenced on 6th June and extended over a period of three weeks. The Malayan field course also occupied a period of three weeks commencing on the 4th June.

The course was attended by 27 delegates from seven countries; with two exceptions the delegates belonged to one of the medical services of their country of origin.

Australia sent two delegates, one from the Sydney School of Tropical Medicine, and one from the New Guinea Public Health department.

China sent three delegates, two of whom were from the National Health Administration.

Indo-China sent two delegates, Japan two, and Siam two.

Malaya naturally provided the largest number, namely, eleven delegates, all but one members of their medical services.

The Royal Army Medical Corps and the Royal Naval Medical Services each sent one delegate, and, as we have said above, India sent three, one from Madras and one each from the medical services of Baroda and Bhopal.

All the candidates had a knowledge of English and the lectures were given in this language. French was

also spoken in discussion by some of the lecturers and candidates who spoke French had numerous opportunities to read and discuss the work of the course in this language.

The previous knowledge and experience of malaria possessed by the delegates was necessarily not uniform. The majority had had some experience of the control and investigation of malaria before commencing the course and several were experienced malarialogists. This lack of uniformity of previous knowledge was probably less marked than is the case in European courses but it necessitated the inclusion in the course of instruction and practice in the fundamental and elementary aspects of each section of the subject as well as advanced teaching.

THE THEORETICAL AND LABORATORY COURSES AT THE COLLEGE OF MEDICINE, SINGAPORE

The programme of the course was divided into eleven main sections. The first fortnight of the course was devoted to the study of hæmatology, protozoology and entomology; the clinical features, pathology and therapeutics of malaria. With the exception of entomology these studies were completed in this period. The course in entomology extended over the first four weeks and occupied three hours each day. The third and fourth weeks were devoted also to the study of the control and epidemiology of malaria and field demonstrations were given each afternoon. During the last week of the course lectures were given on the malaria problems and methods of control in the Netherlands East Indies and Indo-China, the work of the Malaria Commission of the League of Nations and the history of malaria, and more extended field excursions were organized each day.

The laboratory courses in entomology and protozoology were held in the department of biology in the College of Medicine; an enormous amount of preparation was required for these courses, particularly for the course in entomology. Specimens of adult mosquitoes and larvæ had to be obtained from all parts of the East and the handling and preparation of specimens received from institutions and collectors entailed an enormous amount of work extending over many months. The laboratory was well organized in so far as existing facilities permitted, but we agree with Professor Gater that the courses could have been much improved had sufficient staff, equipment and material been available.

Dr. L. Demeney also gave a lecture and demonstration on the physico-chemical properties of oils in relation to anti-larval oiling in this department.

The clinical and pathology courses were given at the Medical Unit, Tan Tock Seng's Hospital. Systematic lectures were given each morning of the second week on the pathology, clinical aspects and therapeutics of malaria, followed by demonstrations of cases, specimens and autopsies.

The present position with regard to individual treatment, treatment in the field and mass treatment was expounded very thoroughly by the various lecturers, inspired by recent research, the report of the Malaria Commission and their own experience. The contributions to the study of the disease brought about by the study of induced malaria and its treatment were also included.

The course on the epidemiology of malaria was given in the College of Medicine, and consisted of a series of five lectures, illustrated by numerous charts, diagrams and lantern slides. The lectures on epidemiological and statistical methods were completed by an account of the various epidemiological aspects of the disease in certain of the countries of the Far East and particularly in the countries in which the field courses were carried out.

The course on the control of malaria consisted of two parts—systematic lectures and field demonstrations. The lectures were illustrated by lantern slides, charts and diagrams and were given in the College of Medicine. In addition to the field demonstrations included in the

original programme, further demonstrations were arranged at the request of some candidates. They were held in various parts of Singapore Island and Johore and were designed to illustrate the lectures on the various stages and methods of malaria control.

One room in the college was utilized as a malaria museum and many exhibits, including plans, photographs, models, apparatus used in control, and drugs, were on view during the last three weeks of the course. In addition, many of the charts and diagrams used to illustrate lectures were displayed in this room after the lectures for reference by delegates. Exhibitions were also arranged in the Municipal Health Office, Singapore, and the Government Health Office, Kuala Lumpur.

Three cinema demonstrations were given in the College of Medicine and one in the Municipal Health Department, Singapore. These included films showing the bonification methods employed in Italy, control methods used in Malaya and propaganda films.

Field courses

Two field courses were arranged and were held immediately after the theoretical and laboratory courses at the College of Medicine. These field courses were held in Java and Malaya and were attended by 17 delegates. The other delegates were unable to attend as they could not afford the time.

The field course in Java.—This was attended by five delegates and extended from the 5th to the 27th June. The delegates saw the different aspects of malaria work throughout Java and visited many places where anti-malarial work was being carried out.

The methods of control employed in Batavia for dealing with salt-water fish ponds, rice-field malaria in the hilly parts of the country, the growing of cinchona and the physiological action of anti-malarial products were all demonstrated admirably. The vectors in the Dutch East Indies were demonstrated and many examples of species control were shown. The delegates were also given an opportunity to put into practice in the field the methods of survey and spleen measurement which they had studied during the theoretical course. The organization of a propaganda service in a rural district, where films, lantern slides, pamphlets, etc., were used, was demonstrated and the connection between rural hygiene and anti-malaria work was stressed.

The problems associated with the control of *A. ludlowi* in Java and the various methods employed—the biological method applied in brackish fish ponds, the Polder system, filling, etc.—were all demonstrated.

The relation between irrigation work, carried out to dry up rice fields producing a single annual crop, and the control of *A. aconitus* was of the greatest interest to the delegates. The *A. maculatus* problem and the efficacy of the method of providing shade for drains furnished another example of species control. Other practical examples of malaria prevention were found in the methods of crop rotation and of pisciculture applied in a malarial country.

The field course in Malaya.—This course was attended by 12 delegates. The field course was so arranged that delegates were given the opportunity of seeing the methods of control employed under varying conditions in different parts of the country, and the following places were visited:—

Malacca, Kuala Lumpur, Sungei Buloh, Klang, Port Swettenham, Kuala Selangor, Penang, Province Wellesley and Kedah.

The field demonstrations were essentially practical in nature. The value of anti-malarial drainage was demonstrated under varying conditions. Demonstrations of the manufacture of materials used for drainage were given, including concrete mixing, the making of concrete inverts and slabs, Hume pipes and the manufacture of inverts by the process of spun concrete. Various oil sprayers were seen in use and the 'brush oiling' method demonstrated. Other methods of control demonstrated included jungle prophylaxis, fish

control, stream flushing, stone-packing of ravines and drainage schemes associated with water supplies for drinking, washing and agricultural purposes.

Typical breeding places of various species were seen on many occasions and opportunities were also given to collect larvae and adults using various methods. Tidal swamp areas, rice fields and ravines were demonstrated and the methods of control used under particular conditions were shown and explained. The delegates also had the opportunity to study the relation between the health organization and malaria control in urban and rural areas. They saw the working of rural anti-malarial control schemes and visited rural welfare and treatment centres and were given demonstrations of the drainage methods incorporated in the local schemes of village sanitation. Municipal organizations were visited and the methods by which the co-ordination of urban and rural anti-malarial control was assured were shown and explained.

Results

We believe that the object of the course has been attained. The original plan was adhered to, except for a few minor modifications and it appeared to work very satisfactorily on the whole.

The course was, generally speaking, well balanced and co-ordinated. A noticeable feature was the benefit derived by delegates from discussing some problems of their own countries or areas with malariologists from elsewhere. The course was, however, very heavy, the delegates being fully occupied every day until 6-30 p.m. or even later. It is considered that in future the number of hours per diem should be reduced and that more time should be available for the delegates to spend on special examinations and discussions. Certain lecturers issued copies or synopses of their lectures. This proved to be both popular and valuable in that the delegates were able to follow the lectures more closely instead of being occupied in taking notes. The lecturer was also benefited in that he could cover more ground in the time at his disposal. It is hoped that it will be possible to provide copies or abstracts of all lectures for the next course.

It was found that the time devoted to epidemiology was too short and the lack of a special department of epidemiology was very noticeably felt. It is superfluous to emphasize the importance of a department of epidemiology for medical education in general and for post-graduate courses in particular. It was also felt that it would be desirable to provide fuller lists of references to the literature of all aspects of malaria.

FINANCIAL ARRANGEMENTS FOR THE COURSE

The League of Nations provided a sum of \$14,000 for the course. This amount was expended chiefly on six fellowships given to Australia, China, Indo-China, Japan, Malaya, and Siam, on condition that the government of each country sent at least one other candidate at its own expense to attend the course, also on bringing lecturers to Singapore from the Dutch East Indies, Indo-China and different parts of Malaya, on auxiliary staff for collecting the necessary material, and on transport for the field demonstrations held in the Singapore area. Honoraria to certain lecturers participating in the course were paid by the League of Nations from the fees received from the candidates.

SUGGESTIONS FOR THE NEXT COURSE

The maximum number of candidates should be 30 if additional accommodation and equipment are provided. Under the present conditions the number should be limited to 20. The number of candidates this year resulted in overcrowding of the laboratory.

Candidates should be required to have had some previous knowledge of haematology and malaria.

The programme should be fundamentally the same as this year, but if possible it should be so arranged that candidates with considerable previous experience, who are more interested in lectures on special subjects

and field work, could benefit from the course without incurring loss of time.

The course might begin with elementary knowledge and laboratory methods, and the lectures on special epidemiology, malaria control, induced malaria, immunity, new methods, etc., and the field work in Singapore should be arranged to take place during the latter part of the course.

Time should be provided during the course, preferably during the third week, for discussion of malaria problems as a result of information supplied by the candidates regarding their respective countries. Under such circumstances, experienced malarialogists could attend the latter part of the course only and benefit from the field work and lectures on recent research and methods.

The field work alone could be attended by fully-trained malarialogists and the theoretical and laboratory courses could also be taken separately.

A special ward for research in connection with the local malaria would also be useful for competent malarialogists and laboratory facilities should be available for those wishing to investigate special problems.

BOMBAY MEDICAL COUNCIL

The following extracts from the summary of the proceedings of the meeting of the Bombay Medical Council held on the 3rd September, 1934, are published for information:—

The Council proceeded to consider the conduct of Mr. Michael Simon Judas DeSouza, Retired Military Sub-Assistant Surgeon, in giving two incorrect certificates to two passengers, wishing to sail ex-India, to the effect that they had been re-vaccinated by him on 28th April, 1934, whereas they were actually not in Bombay on that date and thus rendering himself liable to be proceeded against for infamous conduct in a professional respect.

The Council held that Mr. DeSouza had been guilty of infamous conduct in a professional respect and the Registrar was directed to remove Mr. DeSouza's name from the Bombay Medical Register.

The Council proceeded to consider the conduct of Mr. Ganpat Subrao Kasyapi, L.M.&S., in completing and submitting on 23rd July, 1933, post-mortem examination reports on three dead bodies received by him for the purpose on the same day from the police and answering every one of the several questions laid down in the form of report regarding the different parts, internal and external, of the bodies, whereas he had actually not opened any of those bodies, so that the detailed information given by him as to the internal organs of the bodies must have been untrue to his knowledge, and thus rendering himself liable to be proceeded against for infamous conduct in a professional respect.

After hearing the counsel by whom the practitioner was represented and after some deliberation, the Council decided to postpone the further consideration of the case to a session of the Council to be held after a year.

The Council resumed consideration of the application made by Mr. B. H. Bhatt, M.B.S., for the restoration of his name to the Bombay Medical Register and, after taking into account the legal opinion obtained as to the exact powers of the Council in dealing with such matters, agreed that the resolution previously adopted by the Council approving the restoration of Mr. Bhatt's name to the Register should stand.

The Council considered the suggestions made by the executive committee regarding the examinations to be visited by the visitors appointed for the purpose by the Council at its last meeting and approved the proposal that two visitors should visit all the examinations to be held next for the L.C.P.S. of the College of Physicians and Surgeons of Bombay.

The Council considered suggestions received from Capt. C. V. Thornton, R.A.M.C. (Retired), Mr. M. N. Talati, L.C.P.S., a Member of the Bombay Medical

Council, and the Chairman of the meeting of the Medical and Dental Professions of Bombay held on 18th March, 1934, regarding prohibition of non-nationals from practising in India, and it was resolved that the question raised by them be referred to Government.

THE DR. B. S. SHROFF MEMORIAL GOLD MEDAL OF THE BOMBAY MEDICAL UNION

The following subject has been selected by the Bombay Medical Union for competitive thesis for the above prize for 1934:—

Old and New Remedies in the Treatment of Malaria

The award will be in the form of a gold medal called the Dr. B. S. SHROFF MEMORIAL GOLD MEDAL OF THE BOMBAY MEDICAL UNION.

The competitor must be (i) a duly qualified member of the medical profession holding a degree or degrees and diplomas from Indian and other universities created by statute, or (ii) a duly qualified member of the medical profession holding the diploma of membership of the College of Physicians and Surgeons of Bombay.

The thesis must be sent in six typed copies so as to reach the honorary secretaries, Bombay Medical Union, Blavatsky Lodge Building, French Bridge, Chowpatty, Bombay, on or before the 2nd January, 1935.

The thesis should be designated by a motto instead of the writer's name, and should be accompanied by a sealed cover containing the name of the writer and his post-office address.

The name of the prize, the year of competition, the subject of the thesis and the writer's motto should be superscribed on the cover.

No study or essay that has been published in the medical press or elsewhere will be considered eligible for the prize, and no contribution offered in one year will be accepted in any subsequent year unless it includes evidence of further work.

The accepted thesis shall be the property of the Bombay Medical Union.

All other theses shall be returned if not accepted provided the return postage expenses are paid in advance by the writer.

In the award of the prize to the successful candidate, the decision of the committee shall be final.

BENGAL COUNCIL OF MEDICAL REGISTRATION

The following is an abstract of the minutes of a meeting of the Bengal Council of Medical Registration No. 68, dated the 16th February, 1934.

1. Minutes of a meeting of the Council, dated the 27th July, 1933, were confirmed.

2. Government of Bengal Notification announcing the election under clause (e) of Section 4 of the Bengal Medical Act, 1914, of the undermentioned gentlemen as members of the Bengal Council of Medical Registration were recorded:—

(1) Lieutenant-Colonel E. H. V. Hodge, M.D., M.R.C.P., I.M.S.

(2) Major B. G. Mallya, M.D., F.R.C.S.E., I.M.S.

(3) Dr. Ramgati Banerjee, M.B.

3. Government of Bengal Notification announcing the appointment of Dr. Taraknath Majumdar, L.M.S., D.P.H., D.T.M., F.C.S., and Dr. T. Ahmed, M.B., D.O.M.S., F.R.C.S., representatives of the Bengal Council of Medical Registration and State Medical Faculty of Bengal, as members of the Sanitary Board, Bengal, for one year was recorded.

4. Reports on the inspection of the undermentioned medical schools were considered:—

(1) Dacca Medical School.

(2) Lytton Medical School, Mymensingh.

(3) Calcutta Medical School.

(4) Jackson Medical School, Jalpaiguri.

5. Report of the Inspection Committee regarding the following items were considered and adopted:—

(a) Dr. A. D. Mukherjee's suggestion regarding the basis of calculation of maximum number of students that may be admitted to recognized medical schools (withdrawn).

(b) Returns submitted by recognized institutions, and

(c) Recognition of the Bengal Medical Institute, Balinghata, Calcutta (not recommended).

6. It was decided that a recommendation be made to Government for sanction to the proposal that 'License in Tropical Medicine' granted by the Calcutta School of Tropical Medicine be recognized as registrable under Section 21 of the Bengal Medical Act, 1914.

7. A Penal and Ethical Cases Committee was appointed for 1934 and Lieutenant-Colonel T. C. Boyd, F.R.C.S., D.P.H., I.M.S., was appointed the Convenor of the Committee.

8. A report of the Penal and Ethical Cases Committee dated the 29th January, 1934, was adopted.

9. Dr. J. C. Chatterjee, I.M.S., was reappointed a representative of the Council on the Managing Committee of the Provident Fund of the office for 1934.

10. It was decided that the undermentioned schools be inspected during the next six months:—

(1) National Medical Institute, Calcutta.

(2) Ronaldshay Medical School, Burdwan.

(3) Bankura Sammilani Medical School.

11. Entries of the qualifications D.T.M. & H. (Eng.) and D.T.M. (J'pool) were sanctioned under Section 21 of the Bengal Medical Act, 1914, against the names of Major Sukumar Nag, I.M.S., and Dr. Jagat Ram Bhatia, M.B., respectively.

12. The budget of the Council for 1932-33 was passed.

THE WILLIAM GIBSON RESEARCH SCHOLARSHIP FOR MEDICAL WOMEN

MISS MAUD MARGARET GIBSON has placed in the hands of the Royal Society of Medicine a sum of money sufficient to provide a Scholarship of the yearly value of £292, in memory of her father, the late Mr. William Gibson, of Melbourne, Australia. The scholarship is awarded from time to time by the society to qualified medical women who are subjects of the British Empire; and is tenable for a period of two years, but may in special circumstances be extended to a third year. The next award will be made in June, 1935.

In choosing a scholar, the society will be guided in its choice 'either by research work already done by her, or by research work which she contemplates. The scholar shall be free to travel at her own will for the purpose of the research she has undertaken'.

There is no competitive examination, nor need a thesis or other work for publication or otherwise be submitted. The society has power at any time to terminate the grant if it has reason to be dissatisfied with the work or conduct of the scholar.

Applications should be accompanied by a statement of professional training, degrees or diplomas, and of appointments, together with a schedule of the proposed research. Applications must be accompanied by testimonials, one as to academical or professional status, and one as to general character. Envelopes containing applications, etc., should be marked on top left-hand corner 'William Gibson Research Scholarship' and should be addressed to Mr. G. R. Edwards, Secretary, Royal Society of Medicine, 1, Wimpole Street, London, W.1, and be received not later than Saturday, 1st June, 1935.

Current Topics

Primary Glaucoma

A Symptom-Complex of Epidemic Dropsy

By E. W. O'G. KIRWAN, M.D., F.R.C.S.I.

(Abstracted from *Archives of Ophthalmology*, July 1934, p. 1)

EPIDEMIC dropsy is a disease which is common in Bengal and which presents the following features:

(1) It always affects rice eaters. The incidences are high when rice is the staple article of diet, low when a little rice is eaten and nil when no rice is consumed. In nearly all cases the disease is caused by rice that has been parboiled, highly polished and stored in hot and damp places for months after milling.

(2) In many outbreaks of the disease it has been possible to trace the source of infection to the same rice store, although the people affected have been widely separated. In early cases, if rice is eliminated from the diet the disease ceases to progress, but in advanced cases in which considerable damage has been done to the tissues the disease often fails to respond quickly and frequently progresses for a considerable time. Outbreaks of epidemic dropsy usually occur during the rainy season and the months immediately following the rains although they have been known to occur during any season.

(3) When the new rice crop is used, the disease quickly disappears. Both sexes are equally affected. Children do not escape the disease, although infants are not affected. The disease occurs most often in people of the middle class who lead a sedentary existence, such as clerks and students, and is uncommon among the labouring class. Servants of the household are often affected, since they eat the same parboiled rice as their masters. The disease occurs principally among Hindus whose staple article of diet is rice, but it is common among Mohammedans, who are also rice

eaters. Cases occur among Anglo-Indians and Europeans, but they are uncommon and are usually in the very poor whose principal article of diet is rice.

(4) The aetiology of the disease is not definitely known, but it is generally agreed that epidemic dropsy is a different disease from beriberi. Both diseases belong to a toxic group in which the three principal signs are oedema, hypertrophy with dilatation of the heart and peripheral neuritis. In epidemic dropsy oedema and peripheral neuritis are usually present, but peripheral neuritis is absent as a rule, while in the dry variety of beriberi there are peripheral neuritis and cardiac lesions, but oedema is never a marked sign. Beriberi is caused by a deficiency of vitamin B in the diet and can be produced by rice, but it occurs in epidemic form and is associated with conditions of famine, while epidemic dropsy is caused by a toxin produced in diseased rice, partly manufactured in the rice itself before ingestion and partly in the alimentary canal of the affected person. The latter origin explains the continuation of symptoms in persons who have ceased to eat infected rice.

Acton, Chopra and their co-workers in the School of Tropical Medicine, at Calcutta, isolated a spore-forming proteolytic bacillus of the *vulgatus* group which is commonly found in diseased rice; this bacillus has been found in the urine and stools of a number of patients. It produces a toxin which is soluble in water, resembles histamine and causes a 'cardio-capillary crisis'. The toxin develops in rice stored in damp, dark places during the hot and rainy seasons and resists destruction by cooking. The infected rice grains are usually found to be spotted or wholly opaque and may float on water. Under the low power microscope, yellowish, oval bodies are sometimes seen.

According to Chopra, the toxins are absorbed through the liver, which shows the typical lesions, and thus get into the general circulation. Symptoms may start

as early as twenty-four hours after the ingestion of infected rice and may continue for many weeks after the patient has ceased to eat infected grain. The toxins may be stored in the cells of the liver and other glands of secretion, and the digestive juices and bile may be the path by which the toxin is poured into the intestine, causing the gastro-intestinal symptoms to persist. Elimination takes place by the feces and urine, and a relapse is known to occur after an initial improvement, which can be explained only on the grounds that a dose of this stored-up toxin is released into the general circulation. The disease is not infectious and is not spread by patients who go to non-endemic areas for a change of climate. The rare cases in which people have been affected after contact with persons suffering from the disease have invariably occurred in endemic localities or following the ingestion of rice imported from these areas.

(5) One attack does not confer immunity, but rather predisposes persons to a relapse in subsequent epidemics if they eat infected rice, and they are the first to contract the disease. They appear to become permanently sensitized to the toxin and should therefore give up eating rice.

(6) The best prophylactic against epidemic dropsy is to expose the rice to the sun properly at regular intervals during the hot and rainy seasons and not to keep it perpetually in dark, damp places.

CLINICAL FEATURES

In most cases there is an initial toxic diarrhoea, which may be mild or severe, associated with nausea or vomiting. Aeton and Chopra found typical Gram-positive bacilli in the stools of these patients early in the disease, while the majority of the organisms in the stools of the controls were Gram-negative bacilli with the ordinary Gram-positive cocci. In severe cases diarrhoea sometimes persists for a long time, but in mild cases it may be absent, or constipation may be present. Gastro-intestinal symptoms vary inversely as cardiac symptoms; diarrhoea brings relief in severe cases, while constipation is often accompanied by cardiac symptoms.

The occurrence of an unexplained dropsy in several members of the same family takes place only in epidemic dropsy or beriberi. Oedema usually appears after the gastro-intestinal symptoms, yet many cases occur in which oedema is the first sign to be noticed. It is more marked in the lower extremities, but may affect the whole body, even the head. Oedema is the most constant sign of epidemic dropsy, and it may be the only sign. The initial oedema of epidemic dropsy is of the solid type and consists of two stages, dilatation of the capillaries and the production of a small amount of lymph. The skin of the affected part is often dark red and is hot and tender. The discoloration of the skin resembles erythema but is darker, though it never reaches the degree of cyanosis. In some cases dilatation of the capillaries in the skin may lead to bleeding ulcers. As the disease progresses, and the symptoms become worse, the oedema increases in extent and the skin pits on pressure.

The cardiac symptoms are characterized by shortness of breath and palpitation on exertion, and cardiac failure is of the acute congestive type. There is enlargement of the heart, with congestion of the veins, but the valves are not diseased. Tachycardia is constant, varying from 110 to 140 beats per minute, and there is usually a fall of both the systolic and diastolic blood pressure. The capillaries are greatly dilated, so that the affected tissue looks angiomatous from a distance. Rupture of blood vessels is very uncommon.

Lesions of the peripheral nerves are extremely variable and are not reliable in diagnosis. The knee jerks may be absent, exaggerated or normal, so that there is undoubted evidence of neuritis in some cases. The sensory nerves are not involved as a rule. Bronchitis

with profuse sanguineous expectoration, epistaxis and signs of oedema are sometimes present.

The blood picture shows a marked diminution of the red cells; the percentage of haemoglobin is diminished, and the anaemia is of the secondary type and is a prominent feature in all cases. In the early stages of the disease the anaemia may be due to widespread capillary dilatation, causing capillary stasis, and later it may be produced by the action of the toxins absorbed from the alimentary canal. In most cases there is a slight leucocytosis. The total nitrogen value is much below normal, this being due mainly to the diminished number of red cells, as the nitrogen value of the serum has been found to be about normal. The non-protein nitrogen content is normal, which is what one would expect to find, as in epidemic dropsy the renal function is normal. The urea and the creatinine content of the blood do not show any deviation from the normal, although the uric acid content is increased. In most cases examination of the blood shows that there is retention of chlorides, which may be one of the causes of the oedema. The oedema is not cardiac in origin, as in many cases in which oedema was marked cardiac symptoms were slight or absent altogether, and many patients without appreciable anaemia have died of cardiac failure. In epidemic dropsy there is hydraemia of the blood, the mottled erythema of the skin and the areas of capillary dilatation, often accompanied by pemphigoid eruptions, show that the oedema is not passive but that there is some active change going on in the capillaries, so much so that they have multiplied, leading to the formation of angiomatous masses. The calcium content of the blood is below normal. In normal serum, the quantity of albumin exceeds that of globulin, the relation being 1.5:1, but in epidemic dropsy the serum albumin is considerably decreased and the globulin content is nearly three times that of the albumin content.

As a rule, the signs and symptoms of epidemic dropsy appear a short time after infection, the period varying according to the severity of the epidemic. It is possible that there may be some variation in the micro-organisms that cause the toxins, as there is a certain amount of difference in the clinical signs of the disease. For example, in some epidemics the skin was harsh and dry, while in others it showed diffuse erythema. In some epidemics there were marked cardiovascular signs and symptoms, while in others the heart and the pulse rate were normal. Again, in some epidemics nervous manifestations such as exaggerated reflexes and paralysis of muscles were present, while in others the nervous system was not involved.

In epidemic dropsy, the pathology of particular interest is the dilatation of the capillaries, which is most marked in the fatty tissue underneath the pericardium and the peritoneum. This dilatation is also found in the alveolar capillaries of the lungs, in the uterus, in the ovaries and in the intestines. It has been observed to occur where the vessels are least supported. There is no inflammatory reaction or wandering cells around the dilated blood vessels, and, as a rule, there is little tendency to haemorrhage, although haemorrhages do occur. Occasionally dilated blood vessels in the skin project forward, forming hemangiomas, and at times these rupture and bleed profusely. Dilated blood vessels were also found in the ciliary body, iris and choroid in cases in which there were no clinical ocular signs or symptoms before death. I have never studied the morbid anatomy of the eye in cases of epidemic dropsy associated with glaucoma, as in the large number of cases in which I have operated I have been fortunate enough never to lose an eye.

with epidemic dropsy was first reported of 100 cases which of epidemic dropsy from 1908

10 1909. Observations on 253 cases in Bengal were reported by Mukerji in 1927.

During the last quarter of 1929 and the first quarter of 1930, a large outbreak of epidemic dropsy occurred in Bengal and Calcutta and, during the last quarter of 1932 and the first quarter of 1933, there was a less severe outbreak in the same areas. During these outbreaks a large number of cases of glaucoma occurred; 325 of the patients came under my care, the affected persons being from Calcutta and from various endemic areas in Bengal.

The glaucoma associated with epidemic dropsy is of the primary non-inflammatory type, and the eye remains quite white even in cases in which the tension is extremely high.

Increased intra-ocular tension usually occurs as a late manifestation of the disease, but in the epidemic of 1932 to 1933 a large number of persons with glaucoma were seen with slight or no other general signs of the disease. Some of those in the latter category gave a history of having contracted the disease in a previous epidemic but, on the other hand, a number gave an irrelevant history, so that in some cases the toxin showed a special predilection for the intra-ocular capillary endothelium, while in the majority of cases this endothelium was involved with the general endothelium system of the body.

The incidence of glaucoma as regards the type of person, age and sex is the same as in the general disease. It is more often seen in persons between the ages of 20 and 35, but I have frequently seen cases of glaucoma associated with epidemic dropsy and a high intra-ocular tension in Indian boys and girls from 8 to 15 years of age.

The first symptoms of glaucoma to be noticed are rainbow colours, haloes around lights and gradual diminution of vision. These haloes are at first transient, but as the disease becomes more marked, they become permanent. Both eyes are usually affected at the same time, although some patients give a history of one eye being affected first. Patients complain also of difficulty in reading, as their sight is blurred. The disease is not accompanied by pain, as a rule, but occasionally there is a sensation of discomfort or heaviness in the eyes. Nausea and vomiting are absent. In almost all cases the conjunctiva and sclera are not affected except for the turgescence of the anterior ciliary veins, which stand out prominently. In the few cases in which congestion of the conjunctiva was observed it was explained by the previous instillation of physostigmine. The corneas may be normal in appearance, or they may have a steamy or ground-glass appearance, depending, as a rule, on the amount of increased tension in the eyes, but in all cases examination with the corneal microscope shows evidence of corneal oedema. The rainbow rings, which are due to oedema of the cornea are always a marked symptom of the disease, and they are an important point in distinguishing the glaucoma of epidemic dropsy from ordinary primary glaucoma, as in the latter variety the rainbow haloes are not always present. The anterior chamber is never shallow as in other types of glaucoma; it is either normal or deeper than normal, and there is never any pushing forward of the lens and iris. The glaucoma is therefore of the anterior segment type, in contradistinction to the posterior segment type in which the anterior chamber is shallow. Swelling of the vitreous body, which usually plays a predominant part in the pathogenesis of glaucoma, is absent, and therefore swelling of this body is not necessarily an essential factor in the causation of glaucoma. The increased intra-ocular pressure is due to the dilatation of the capillaries of the uveal tract followed by an increased permeability of the endothelial walls which leads to an increased output of intra-ocular fluid in the anterior segment of the eye. The pupil is normal in appearance and reacts well to light and in accommodation. Examination with the corneal microscope shows no evidence of inflammation in the aqueous or the iris. In the cases studied, dilatation of the vessels in the iris probably was present, but the vessels

could not be seen owing to the heavy pigmentation of the iris in natives of Bengal. The ciliary body like the iris was not involved, except that weakness of accommodation was nearly always present. The media and lenses were normal. Even in advanced or absolute glaucoma of this type opacities of the lens have never been observed. The fundus cannot always be seen clearly owing to the corneal oedema, but in most cases glaucomatous cupping is not present. In long-standing cases of two or three months' duration, cupping is present with evidence of atrophy of the disc, and the cupping becomes more marked according to the duration of the disease. The fundi were carefully examined in a large number of cases before operation and also after operation when the intra-ocular tension had decreased to normal, and there were no gross changes. The veins either were normal in size or showed some engorgement, and they appeared much darker than normal. Chopra noticed in many of his cases that on venesection the blood was dark chocolate-coloured instead of dark red and that the serum was bile-tinted. His observations can be verified by ophthalmoscopic examination. Retinal exudations do not occur.

The outstanding phenomenon of this variety of glaucoma is the extremely high tension. It is rarely below 50 mm. of mercury (Schiotz) and tensions of from 70 to 100 mm. of mercury are quite common. I have seen some cases in which the intra-ocular tension was over 100 mm. of mercury. The tension, as a rule, remains high constantly, but cases occur in which it varies tremendously, even dropping to normal for a short time. Both eyes are affected, although I have seen a case in which one eye was affected at first and the other was involved a month later. The tension is usually about the same in both eyes. With such high tension, one wonders why blindness from optic atrophy does not result much more quickly. The optic nerves seem to resist the high tension for a number of weeks before any evidence of atrophy is found in the visual fields, but unless the tension is relieved optic atrophy of some degree invariably results, at times progressing to complete blindness. Cases are seen in which the glaucoma disappears spontaneously after the general disease has disappeared, leaving the defects in the visual fields dependent on the duration of the increased intra-ocular tension.

The defects in the visual fields in the glaucoma of epidemic dropsy are much the same as in chronic primary glaucoma. In early cases there is depression of the peripheral field starting in the nasal quadrants. The upper, lower or both quadrants may be affected. In later stages the visual fields show concentric depression. Most cases show Roenne's step. The colour fields react in the same way as the fields for white and shrink as the fields become contracted. In more advanced cases there is a general depression of the peripheral fields; the upper and lower quadrants are more affected than the outer quadrant, and the blind area gradually increases till the field is reduced to an oval or irregular area, leaving the fovea and the blind spot intact. This field may be horizontal on the temporal side, but it may be in one or the other quadrant. In more advanced cases the central vision disappears, leaving only a small eccentric field, and finally this small area also disappears. As in primary glaucoma, various atypical fields are found in the early stages. One quadrant in the nasal field may be affected out of all proportion to the other; the visual fields of the two eyes may be markedly different, and the blind area may be more advanced in one eye than the other, but the nasal fields are always more affected than the temporal fields. Examination of the central field shows a pericæcal depression, and the scotoma, relative or absolute, is continuous with the blind spot to a varying extent. In later stages Seidel's and Bjerrum's signs can be demonstrated according to the duration of the disease. Cases have been seen in which the visual fields improved after operation, Bjerrum's scotoma changing again into Seidel's scotoma; the latter

may diminish in size or may disappear completely, leaving the blind spot normal.

Some observers state that glaucoma does not occur in cases in which there is profuse diarrhoea, but this is not my experience, and I have seen many cases with high intra-ocular tension accompanied by diarrhoea. Purgation produced by the administration of saline solution has no effect in lowering intra-ocular tension in this type of glaucoma.

In the treatment of the general disease the important thing is to eliminate rice completely from the diet and to wash out the alimentary canal by the administration of purgatives and large amounts of fluids. Convalescence is slow, and recovery may take a considerable time, depending on the severity of the attack. In mild cases, the most practical therapeutic measure is to get the patient away from the endemic area, as it is difficult for the average Indian patient to refrain from eating rice, his staple article of diet, for any considerable time. The dietetic and medicinal treatment for this type of glaucoma are most unsatisfactory. Some patients get well without therapy, but invariably a damaged visual field results, depending on the severity and duration of the disease. Purgatives, diuretics and diaphoretics are of little use, even to reduce the tension to a lower level. Intravenous injections of hypertonic saline solutions have been tried without any effect. Miotics, such as pilocarpine and physostigmine, are practically useless, and these have been used so extensively that the pupil becomes pinhole in size. This therapeutic sign is useful in the differential diagnosis from ordinary chronic primary glaucoma, in which the tension usually reacts more or less to miotics. Epinephrine packs placed under the upper lids have also proved useless. I never prescribed physostigmine in cases of epidemic dropsy associated with glaucoma, as it has the added disadvantage of causing hyperemia of the conjunctiva, thus making operative treatment more difficult.

As long as the visual fields show no defect, there is no necessity of carrying out an immediate operation in the hope that the general disease, and with it the glaucoma, will be cured before the optic nerves become permanently damaged by the increased intra-ocular tension. The patient should be kept under observation and should refrain from eating rice, but as soon as defects in the visual fields become evident operation should not be delayed. One would think that this type of glaucoma is, of all known varieties, a primary glaucoma, and that a temporizing operation could be done, as the patient will get well spontaneously when the cause is removed and all that is necessary is to keep the tension down until this end is achieved by repeated anterior sclerectomies. In practice this is not sufficient, as it takes a considerable time to get the disease under control in spite of the withdrawal of rice from the diet and the use of eliminative treatment. I have carried out repeated anterior sclerectomies in a large number of cases, but they only lower the tension for a number of hours. Since I have found the tension to be as high or even higher twelve hours after operation, this type of treatment has been abandoned. A complete iridectomy was also tried in a number of cases and was found to be of little use in keeping the tension down. By far the most successful method is the Elliot operation with a 15 mm. trephine. During this operation, as may be expected, the iris balloons into the trephine hole and the aqueous escapes under great pressure. A small peripheral iridectomy is done. I have never seen intra-ocular hemorrhage at the time of the operation, even when operating on eyes with extremely high tension. The results of trephining are excellent, and the tension seldom rises again once the decompression is carried out. I have found in a small number of cases a moderate increase of tension several days after operation, but this can always be controlled by gentle ocular massage. In the course of time, when the general disease is cured, the trephine

hole closes. I have had to perform a second trephination on some patients in whom glaucoma developed again in a subsequent attack of epidemic dropsy. It is of interest to note that in this type of glaucoma the optic atrophy is caused by the increased intra-ocular pressure alone and cannot be attributed to the toxins that cause epidemic dropsy. Once the increased intra-ocular tension is relieved by operation and the tension of the eye remains normal, optic atrophy ceases to progress. In a number of patients I have observed the fields carefully for a considerable time after operation, and in a few patients up to a maximum period of six years, and invariably the field has remained the same or has slightly improved after operative treatment. Another point of great practical interest is that I have never seen a case of this type of glaucoma in which opacities of the lens have developed after operation which could be attributed to sclerocorneal trephining; neither have I seen a case of late infection after operation.

SUMMARY

Primary glaucoma in association with epidemic dropsy is due to toxins which contain bodies of the histamine group, and the glaucoma is of the chronic primary non-inflammatory type. The toxin circulating in the blood causes a vascular disturbance which upsets in some way the normal function of the intra-ocular capillary endothelium as well as causes dilatation of the general capillary field which leads to an increased output of tissue fluid. As the glaucoma is only part of a generalized disorder, the treatment should be medical if only a speedy method were known to rid the body of the toxins. The operative treatment is symptomatic and is intended to prevent permanent damage being done to the retina by the increased intra-ocular tension till the general disease has been cured by the elimination of the offending toxins. Is the pathologic progress of the other varieties of primary glaucoma somewhat similar to that associated with epidemic dropsy? This subject presents a large field for experimental work, and if it is carried out one can look forward to the day when a great part of the problem of glaucoma will be solved by therapeutic measures or methods of prevention.

Vitamins in Clinical Medicine

By S. J. COWELL, M.A., M.B., M.R.C.P.

(From the *Practitioner*, Vol. CXXXII, January 1934, p. 15)

THE average individual requires of his food that it shall satisfy three or perhaps four conditions. It must satisfy his hunger, it must be appetizing, it must not give him indigestion, and it may have to be attractive to the eye. Observations of the feeding habits of various races of mankind have established the fact that even if these conditions are fulfilled the human species may be content to go on from generation to generation making use of dietaries which are incapable of producing perfect physical development or of maintaining individuals in a state of normal health. When the comparatively recent science of chemistry was first applied to biology it was natural that attempts should be made to analyse the substances used as foods by living animals, and it was equally natural that those components should first be recognized which were present in relatively large amounts. Thus attention soon became drawn to the so-called main constituents of foods, the proteins, fats, carbohydrates and mineral salts, and physiologists set about the investigation of the individual rôles that these constituents played in nutrition. For a time it seemed possible that the secret of good nutrition depended on the supply of the correct proportions of the main constituents, but a series of carefully planned experiments eventually showed that this was not the case. In the first place all proteins were not alike in their capacity for supporting normal

nutrition. It was possible to give animals a plentiful supply of some kinds of protein without their being able to utilize efficiently the nitrogen of that protein. Further, even when an adequate supply of good quality protein was assured, together with a mixture of pure fats, carbohydrates and mineral salts such as occur in foods known to be naturally nutritious, growth and normal nutrition might fail to occur. It was from the results of such experiments that Sir Frederick Gowland Hopkins felt compelled to postulate the presence in naturally occurring foods of 'accessory substances' which were essential components of the diets of animals.

The result of this epoch-making discovery has been an intensive search for the accessory substances—a search which has been so far successful that some seven or eight have already been identified, either by actual separation as pure chemical substances, or by means of more or less specific biological reactions. These substances, which are known to-day as vitamins, are not by any means distributed uniformly in foods, and there is abundant proof that whole races of men, whether living under civilized or uncivilized conditions, are capable of habitually consuming diets which are relatively deficient in one or more vitamins and for that reason allow the development of definite diseases or states of ill-health which would not arise if the deficiencies in the diets were made good. This state of affairs seems to imply that man, by taking a conscious interest in the selection and preparation of his food and pandering to his palate, has lost that instinct for the choice of suitable food which his remote ancestors presumably possessed and which his humbler fellow creatures still appear to possess. Hence man has to be taught that his food must satisfy yet another condition: it must contain an adequate supply of all those essential accessory substances which he is unable to manufacture in his own body from the main food constituents which serve to satisfy his appetite and his energy requirements.

The demonstration, that well-defined symptoms of disease and pathological changes in the tissues result from an insufficient supply of specific food factors which are usually present only in minute quantities in natural foods, has proved of immense practical value in the fields of clinical and preventive medicine. There are, it is true, critics who tend to disparage the importance of these discoveries. A common form of criticism is to deny the applicability of the results of modern nutrition experiments to human beings on the grounds that the metabolism of men differs widely from that of experimental animals. Such criticism would be justified if those who announced their experimental findings put forward categorical claims that their results could be applied to clinical problems without further trials; but this is not the case with honest investigators. These latter certainly do frequently suggest the possibility that some new experimental finding may throw light on the ætiology and treatment of human disease. It is surely then the duty of the medical practitioner to test the point in his clinical work before he condemns it as worthless.

A second form of criticism is to decry the value of the vast amount of labour that is devoted to isolating the specific food constituents. It is sometimes argued that no good can come from any attempt to identify and concentrate these substances; what men require, such critics say, is a mixed diet composed of good natural food produced under the best possible conditions, and then no one need bother about vitamins. Such arguments deny in effect the value of exact knowledge in an important branch of medical science and are therefore scarcely to be listened to with patience. It must be realized that only since the discovery of the vitamins has it been possible to attempt to define good food in a physiological sense. Moreover, although the ideal diet is undoubtedly one

composed of natural foods produced under such conditions that they contain liberal supplies of all the health-promoting constituents, there are times when the treatment of certain diseases is rendered far easier because of the availability of concentrated preparations of some of these constituents.

It is obviously impossible in a short article of this nature to discuss critically the individual properties and physiological effects of the vitamins, but a brief statement of some of their chief sources and clinical uses may indicate the present development of knowledge in this field. The time will shortly come when the individual vitamins will be referred to by names which represent their chemical individualities and not by the letters of the alphabet which at the present time are still their more or less official designations. Vitamin A, the original fat-soluble vitamin, has been prepared in a highly concentrated form, but its chemical constitution has not been ascertained with sufficient certainty for it to have received a name indicating its chemical structure. The vitamins were originally believed to be manufactured only by plants and not by animals, but this view can no longer be accepted. Vitamin A can be made by animals from its precursor carotene, a yellow pigment which is widely distributed in the plant world. Different species of animals apparently vary in the ease with which they can transform carotene into vitamin A, but those animals of which man is probably one, which readily effect this transformation, can obtain their necessary supplies of this vitamin either ready made from food of animal origin or from vegetable foods containing the precursor carotene. The chief sources of vitamin A are the livers of certain fish and mammals, dairy produce from well-fed animals, eggs and animal fats. Carotene is found in yellow root vegetables, green leaves and many coloured fruits and seeds. Vitamin A concentrates are made chiefly from the liver oils of fish and mammals, the liver oil of the halibut being one of the richest sources known.

One of the most characteristic properties of vitamin A is its power of influencing the development of epithelial structures in the body. In the absence of this vitamin from the diet, the cells lining the respiratory, alimentary and genito-urinary passages, as well as those of certain glandular organs, lose their normal structure and arrangement and tend to be changed to layers and nests of keratinized epithelium. The change is of great importance for the reason that the altered epithelial surfaces permit the invasion of bacteria, so that infections are more likely to occur in animals suffering from a deficiency of this vitamin in their diet. Exactly how far a plentiful supply of vitamin A will protect human beings from infections is not known. There is evidence that it reduces, without eliminating, the incidence of certain types of infection, for instance puerperal infections and pneumonia—as a complication of measles. On the other hand, it appears to have no effect on the incidence or course of otitis media as a complication of scarlet fever.

The signs of gross deficiency of vitamin A in human beings most frequently recognized are xerophthalmia and acquired night-blindness, which are not uncommonly associated in the same individual. Such cases are met with in our own country, and it is of importance that this fact should be recognized because they respond very quickly to appropriate treatment in their early stages and can be completely cured. There is also evidence that deprivation of vitamin A leads to a variety of nervous lesions caused by degeneration of peripheral nerves and tracts in the central nervous system. Such degenerations are intensified, at least in experimental animals, by certain common food principles of which one is a substance of unknown composition present in the germ of cereals. How far such observations will be found to shed light on the ætiology of nervous disorders in man remains to be seen. In any case there are indications that vitamin

A has a profound influence on the functioning of the body tissues and that a plentiful supply in the diet produces beneficial effects which are not to be expected when the supply is limited to that minimal quantity which will just prevent the appearance of characteristic symptoms of absolute deficiency.

Vitamin D, the antirachitic vitamin or calciferol, is another of the vitamins which may either be supplied ready made in the diet or be elaborated in the animal body from its precursor ergosterol. But in this case the elaboration within the animal only takes place under the influence of ultra-violet light applied to the surface of the body. Vitamin D differs from most of the other known vitamins in the relative paucity of its distribution in common foods, egg yolk and butter being the only sources which contain it in fair abundance, unless such substances as cod-liver oil are included as common foods. This fact seems to indicate that man is expected to derive his necessary supply of this vitamin from exposure of his body to sunlight. But under present conditions of life in our climate adequate exposure is too often not obtained, especially in the winter months, with the consequence that faulty calcification of the bones and teeth is only too common. It is therefore imperative that growing children should receive some reliable source of vitamin D to ensure their freedom from rickets and to bring about that perfect calcification of their teeth which will enable them better to resist dental caries in later life. This can be done in a variety of ways. The pure vitamin, calciferol, may be given; in this event the dose must be supervised, since large overdoses lead to toxic symptoms. The elaboration of vitamin D may be encouraged by exposure of children to a source of ultra-violet light. The vitamin D content of natural foods, especially milk, may be raised by exposing them to ultra-violet light; such irradiated milk is now produced commercially. Milk used for feeding children may be enriched in vitamin D by an alternative process, namely, feeding irradiated yeast to the cows from which the milk is being produced. Lastly, there is the older but still in many ways very satisfactory method of giving cod-liver oil; this proceeding has the advantage of supplying vitamin A as well as vitamin D, but at least two or three teaspoonfuls of the pure oil, or its equivalent, should be given, except to infants in the first few months of life when the dose is naturally rather smaller.

In connection with vitamin D it should be remembered that the whole problem of perfect bone and tooth formation has not been solved when the supply of the vitamin is ensured. Obviously these structures cannot be effectively produced unless there is a sufficient supply of calcium and phosphorus in the diet to furnish the building material, and the importance of giving milk to children lies in part in the liberal quantities of these elements which milk contains in a readily available form. Again, there are certain common food-stuffs which contain substances which actively interfere with bone and tooth calcification. Of these the cereals are the worst offenders; hence the greater the proportion of the diet that is furnished by cereals, the more important is it that a liberal supply of vitamin D should be given. When circumstances allow, the wisest course is to diminish the cereal intake of children and supply greater proportions of dairy produce and vegetables.

The vitamins we have already considered belong to the group of the fat-soluble vitamins; the second group consists of the water-soluble vitamins, and of these there are recognized a group known as the vitamin B complex and vitamin C, the anti-scorbutic vitamin. The vitamin B complex consists of a number of separate substances of which at least two have already been proved to be of importance in human nutrition. The first, vitamin B₁, is the factor which is lacking in diets capable of causing the disease beri-beri. Its richest sources are the germ of

cereals and yeast, but it is widely distributed in a number of common foods so that symptoms of frank deficiency are not found in those who partake of a mixed diet including such items as eggs, fresh meat, pulses and fresh vegetables and fruit. One of the earliest and most characteristic symptoms of deficiency of this vitamin is loss of appetite, and in experimental animals this is followed by disturbances in the functioning of the alimentary tract generally. This observation has led to the suggestion that partial deficiency of vitamin B₂ is a common cause of constipation and other irregularities of intestinal function. The evidence for this view is conflicting. In the first place it has not yet been definitely settled in the case of the experimental animals how much of the disturbed intestinal function is due to the specific lack of vitamin B₂ and how much is due to the inanition which results from the loss of appetite caused by deprivation of vitamin B₁. In the second place the favourable results which are from time to time reported to follow the giving of preparations of vitamin B to sufferers from chronic constipation have not been proved to be due to vitamin B itself, for as a rule the preparations used take the form of cereal germ which contains many other substances besides the various vitamin B factors.

Vitamin B₂, like vitamin B₁, occurs in yeast and cereal germ, but it is also found in abundance in liver; eggs, milk, meat and green vegetables contain fair quantities. There is a good deal of evidence that the disease pellagra is in some way concerned with a shortage of this vitamin in the diet, although other dietetic faults probably contribute to the production of the disease. Cases of recognizable vitamin B₂ deficiency are seldom met with in this country except, possibly, in those whose absorption of food is seriously interfered with as the result of chronic intestinal diseases.

The last vitamin to be mentioned is vitamin C, the anti-scorbutic vitamin. This vitamin has now been identified with a chemical substance known as ascorbic acid, originally obtained from the suprarenal glands and lately found to be present in the pituitary. Its best known natural sources are the citrus fruits and the green leaves of vegetables. Cases of scurvy are not rarities in this country, and are not very infrequently seen in infants who have been fed exclusively on milk which has been overheated. Vitamin C is very sensitive to heat and even raw milk cannot be regarded as one of its rich sources. When milk which has been pasteurized at the dairy is further subjected in the home to boiling there is a grave risk of sufficient destruction of vitamin C to produce manifest scurvy when milk is the only source of this vitamin in the diet. The simplest method of supplying vitamin C to young children is to give orange-juice; tomato-juice is also a good source, and a still cheaper one is the juice expressed from raw swede turnips. There is some clinical evidence, though this is not yet conclusive, that a sub-optimal supply of vitamin C is by no means uncommon in Western countries, leading comparatively rarely to frank scurvy, but being responsible for ill-defined states of malaise and lack of energy.

This outline of the kind of physiological or pathological effects that have already been traced to the presence or absence of specific food constituents in a dietary may perhaps serve to indicate the recent development of the subject. For certain types of patient and in certain circumstances it may be of paramount importance to ensure the completeness in all known respects of diets which are ordered by the physician. During infancy and early childhood the developing body is particularly susceptible to specific dietary deficiencies, and, even though the deficiencies are not severe enough to cause obvious specific lesions at the time, we have evidence that they may cause imperfections in the structure of various tissues in the body which predispose to definite diseased states in

later life. During pregnancy again it is obvious that the mother should be supplied with liberal amounts of the specific food constituents which are necessary to maintain at a normal level her own stores which are at this time being passed on to the fetus. Finally, during the course of any chronic disease for which a diet is prescribed it is the duty of the prescriber to see that all the known essential food constituents are present. It is not improbable that neglect of this precaution is responsible for not a few failures on the part of confirmed invalids to respond to treatment; it may also be responsible for the appearance of frank deficiency diseases grafted on to the original disease. Such *morbus e medico* should not arise if the importance of accessory factors in the diet were duly recognized.

The Modern Treatment of Burns and Scalds and Other Uses of the Two Per Cent Tannic-Acid Compress

By PHILIP H. MITCHINER, M.D., M.S. (Lond.),
R.N.C.S. (Eng.)

(From the *Medical Press and Circular*, 13th December, 1933, p. 536)

It is, of course, in the treatment of burns and scalds that tannic acid has its greatest use, both as a first-aid dressing and for subsequent routine treatment; and it has been found at St. Thomas's Hospital that a solution of more than 2 per cent. tannic acid has no advantage over greater strengths when used either as a compress or for spraying.

If we consider the severe collapse met with in burns and scalds we must realize that tannic acid is the ideal dressing, applied preferably in compress form, as this is applicable to private practice, at the patient's home, or in the hospital outpatients' department, where the spray method is impracticable. This collapse is due partly to the fright and upset of the accident, but much more largely to the absorption of protein bodies from the damaged tissues and the great loss of fluids which occurs from the burnt area; and the tannic acid, by completely coagulating all these damaged tissues, prevents these latter causes of collapse: it is obvious, therefore, that the earlier the tannic acid is applied, the less collapse will result from the burn. For the shock due to the fright, no drug is better than opium, or its derivative morphia, and this should be administered early and freely, preferably in the form of tincture opii.

FIRST-AID TREATMENT

For convenience in works and other places where burns are likely to occur, tannic acid can be made up into a tablet with 1/2000 perchloride of mercury to act as a mild antiseptic, and enable the solution to be made up safely with warm tap-water. No other antiseptic has proved so satisfactory and painless as the perchloride of mercury, though I have tried many at St. Thomas's Hospital.

Tannic acid	..	..	gr. 17½
Perchloride of mercury	..	..	gr. ½
Boric acid	..	..	gr. 1

This tablet keeps indefinitely; it should be crushed well before adding the water, as otherwise solution is slow. The tablet is dissolved in 2 ounces of warm water, and gives sufficient 2 per cent solution to soak a dressing of lint 8 inches by 4 inches.

The lint should be clapped on quite wet to the burn, and the patient should be left quiet for at least twenty minutes before being moved to an institution for further treatment, being in the meanwhile, of course, kept warm and given fluids to drink; while, if a medical man is present, morphia or tincture opii should be administered in dosage according to the table, after which the patient must be left undisturbed until the drug has taken full effect (usually

about twenty minutes) before proceeding with the cleaning which is a necessary preliminary to the final dressing.

TABLE

Opium dosage for cleansing burns and scalds

I.—In children		
Age	Preparation	Dose
1/12	.. Tinct. camph. co.	min. ii-iii
2/12	.. " " "	min. iv-vi
3/12	.. Tinct. opii	min. ½-¾
6/12	.. " " "	min. ¾-1
1 year	.. Tinct. opii (a)	min. ii-iii
	or	
	Inj. morph.	gr. 1/75
Over 1 year	Tinct. opii	min. ii for each year and min. ii in 15 mins. if necessary.
	or	
	Inj. morph.	gr. 1/75 for each year
II.—In adults		
12-15 years	Tinct. opii	min. xxx
	and	
	Inj. morph.	gr. ½
15-20	Tinct. opii	min. xxx
	and	
	Inj. morph.	gr. ½
Over 20 years.	Tinct. opii	min. xxx
	and	
	Inj. morph. (b)	gr. ½-¾
	or	
	Inj. morph. (c)	gr. ½-¾

Remarks.—(a) Tinct. opii is more satisfactory than morphia. (b) For women. (c) For men according to stamina.

N.B.—Should slow or shallow breathing give rise to anxiety, atropine sulphate, gr. 1/200—1/50, should be administered hypodermically.

ROUTINE TREATMENT

It is essential that this first-aid dressing, even if of tannic acid, should be removed, which it can be most easily, and the area carefully cleaned before the final tannic-acid dressing is applied. By this careful cleansing alone can subsequent sepsis be avoided; and here let me say that, should sepsis supervene during a course of treatment, it is only necessary to remove the tannic-acid dressing, re-clean the area thoroughly, and re-apply a new tannic-acid dressing in order to get a good result.

The cleansing must start with the removal of all dead and charred tissues, the excision of all loose skin raised over blisters, and the removal of grease, especial attention being given to the edges of the damaged area. The whole area should then be gently but thoroughly cleansed with soap and water (applied with a sterile swab and not with a nailbrush), and finally carefully sponged over with ether, to remove all natural or applied grease, in order to get a thorough coagulation. It is obvious that this treatment cannot be carried out unless the patient is rendered insensible to the pain which such a cleansing of the damaged area must entail. We have found at St. Thomas's that it is safer and more satisfactory to procure this insensibility by the administration of large doses of opium rather than the use of general anaesthesia, which tends, even with the greatest care in its administration, to be followed by pulmonary complications, usually of a mild nature, which are detrimental to the rapid recovery of the patient. The table indicates the dosage and drug employed at various ages, and has proved both safe and satisfactory.

A compress consisting of either six layers of sterile gauze or three layers of lint should be thoroughly soaked in a stock solution of 2 per cent tannic acid and 1/2000 perchloride of mercury, and applied closely

and evenly over the entire burnt area without wringing the dressing out. This compress should then be firmly and evenly bandaged in position, the bandage being applied directly to the outer side of the compress. The whole of the outside of the bandage may then be soaked with a spray of 2 per cent tannic acid and 1/2000 perchloride of mercury in order to ensure that the underlying dressing is thoroughly wet. Mackintosh or Jaconet should be placed under the patient until the dressing has dried, in order to save soiling of the sheets by the tannic-acid solution; for though this all washes out excepting for a faint iron mould, the sheet subsequently rots in this area. It is also well to secure the burnt limb temporarily in order to prevent undue movement until the tannic coagulum has formed firmly. This dressing should be left in position and untouched for at least a fortnight in the case of small burns and scalds, and three weeks where large areas are involved. At the end of this time the bandage should be cut, and the dressing lifted, when the scab usually will separate completely from the burnt area. If it does not do so the dressing can be re-bandaged and removed later when separation has occurred. The separation may be rendered quite painless, and assisted by spraying with tannic-acid solution between the coagulum and the skin during this process. May I here say that the escape of a little serous or sanioserous fluid from the edges of the coagulum, or the raising in blisters of its centre with serum is no more an indication for interference or removal of the dressings during the first week after their application than it is with the bare coagulum resulting from the 'spray' method.

Temperature and toxæmia as shown by a rapid pulse, dried and furred tongue, and pain, with possibly the escape of sero-pus in considerable quantities, are the only indications calling for removal of these dressings before the time stated, and these indications in our experience are extremely rare, and usually result from a failure in the thoroughness of the preliminary cleansing. Should removal be necessary, and in my experience it is very seldom called for, the area should be re-cleaned carefully, and another tannic-acid dressing applied.

As indicated, the dressing must be closely and evenly applied to the burnt area; and there are certain areas, therefore, such as the perineum, the groin, axilla, the neck, and also the face, where the absence of bandages is an advantage, and where the spraying method gives better results; but the compress method has been, and can be, used with good effect in these areas.

It should be borne in mind that in burns where destruction of the subcutaneous and muscular tissues has occurred, subsequent scarring and contracture are inevitable and it is, therefore, necessary to apply tannic-acid dressings, either by compresses or spraying, with the part in such a position that subsequent contracture may be counteracted. Equally is it obvious that although full epithelialization will have occurred in those areas where the first, second or third degree burn has occurred, an ulcer must be expected, and will be met with in deeper burns; and this, if extensive, should be treated by subsequent autogenous skin grafting, or, if small, by the application of some lotion, of which, in my experience, the most satisfactory is the following: Purified alum, gr. 20; zinc sulphate, gr. 10; glycerin, 7 fl. oz.; water, to one pint.

MORTALITY

It must be realized that the mortality from burns is very much greater (approximately three to one) than that of scalds, where the hot fluid is only in contact with the tissues for a few seconds, and a more guarded prognosis therefore must be given in the case of burns.

It has been shown that whereas with burns treated with oils, etc., death usually occurs from secondary sepsis rather than immediate collapse, both these

causes are largely eliminated in the tannic-acid treatment, which again is more efficient than pierie acid, where only the surface of the damaged tissue is coagulated, and so collapse from absorption in the deeper parts is not prevented, though sepsis is largely eliminated. The attached mortality table speaks eloquently for the value of tannic acid.

Mortality over five-year periods

Dressing	Burns	Scalds
Oil, etc.	39.0 per cent	18.8 per cent
Pierie 1 per cent	15.5 "	7.0 "
Tannic 2 per cent	4.0 "	1.7 "

OTHER USES OF TANNIC ACID

(1) In chemical burns the tannic-acid treatment is also applicable and very successful, but the burning agent must be neutralized before applying the tannic acid. (2) In any superficial wound, such as grazes or abrasions, or the areas from which skin grafts have been removed, or where extensive curettage has been employed, as in dealing with lupus, the tannic-acid compress makes an excellent and quite painless dressing; and on its removal at the end of approximately three weeks the area will be found completely epithelialized. (3) Another use for the tannic-acid compress is in sunburn, where the results are excellent, and the immediate relief obtained most satisfactory. Unless actual blistering is present it is usually sufficient to retain the compress for two or three days only in these cases. (4) A further use can be found in the treatment of radium and x-ray burns.

It will be seen from the foregoing remarks that the tannic-acid compress has many uses apart from the treatment of burns and scalds, where it has been so successful in removing both the sepsis and reducing the mortality, and it is therefore to be hoped that its uses may become more widely known and the practical method of compress popularized.

Principles of X-ray Therapy of Malignant Diseases

By HENRI COUTARD, M.D.

(Abstracted from the *Lancet*, 7th July, 1934, p. 1)

THE two principal factors in x-ray therapy are the energy and the time. They must be considered in their relation to the cancer cells on the one hand, and on the other hand to the vasculo-connective tissue and the general tissues of the site from which the cancer is developing.

In the course of treatment the principal guides have been, for us, the radioreactions of the vasculo-connective tissue, the radioreactions of the covering epithelium, and the radioreactions of the cancer cells.

When one is irradiating a cancer of very small size and very embryonic in type, the treatment can be completed in a short time, about 20 days; the epithelial radioreactions may be relatively intense, on condition always that their duration never exceeds 15 days.

When one is irradiating a cancer less embryonic in type, the treatment ought to be of longer duration, and the epithelial radioreactions ought to be slight.

When it is a question of a very extensive cancer, irradiated through fields of large dimension, as in the case of cancer of the uterus, the treatments ought to be from 40 days as a minimum; the cutaneous radio-epidermitis ought not to be exudative; and the radio-epithelitis of the vaginal, intestinal, or vesical mucosa ought to be very slight. Symptoms, even temporary, of cystitis, proctitis, or enteritis, ought to be avoided.

The question of energy—i.e., of the cancericidal dose—is essential in the treatment of an undifferentiated embryonic, radiosensitive cancer, and it is more important than the question of time. The energy seems to be directly destructive; the chronology is, above all, protective, since it allows the preservation

of the supporting tissues in order to avoid accidents.

The question of time is more important than the question of energy in the treatment of a differentiated, radioresistant cancer. The energy ought not to provoke a destructive effect. Thanks to a slow chronology and to weak daily doses, the disappearance of the cancer cells seems to follow a cellular evolution resembling the normal evolution. In determining the longer duration of treatment one should aim at the perfect preservation of the supporting tissues so that the evolution effect may become possible.

In conclusion, I would say that it is still absolutely necessary to bear in mind that:

1. The cure of cancer by x-rays is still difficult.
2. The cure of cancer by x-rays is still dangerous.
3. A very small margin exists sometimes between the dose which will determine a cure and the dose which will provoke an injury.
4. The daily examination of the patients is necessary; modification of the normal tissues and of the general condition by x-ray treatment sometimes appears so quickly that it is often necessary to diminish the daily dose or the size of the fields in the course of the treatment.

There exists no fixed method of treatment but a simple clinical treatment for each individual patient and for the special type of tumour.

Reviews

THE ANCESTRY OF THE LONG-LIVED.—By Raymond Pearl and Ruth DeWitt Pearl. The John Hopkins Press, Baltimore. Pp. xiii plus 168. Price, \$3.00

THE problem of long life has intrigued the imagination of man at all times and the tradition of a much longer span of life in the spacious days of the distant past than what the modern man enjoys survives among all nations. Among the Hindus the 'Puranas' set forth that it was a slur on the administration of a ruler if his subjects failed to attain the age of a hundred and twenty. Isaiah states his ideal, 'there shall be no more thence an infant of days nor an old man that hath not filled his days: for the child shall die an hundred years old'.

The investigation of the duration of human life has attained a position of acknowledged importance in every civilized community. There is perhaps nothing so uncertain as a prediction about the probable length of life of an individual but, as Babbage has put it, 'few things are less subject to fluctuation than the duration of life in a multitude of individuals'. The life table, which expresses the community's expectation of life, is however useful mainly from the standpoint of the actuary and the public health worker. The individual is more concerned with knowing those specific factors, if any, which enable a small proportion of his fellow men to attain to very high ages while the great majority fall through, to use the language of the 'Vision of Mirza', the gaps in the bridge of life to be swept away by the great tide beneath.

Professor Raymond Pearl and the biological department of John Hopkins University, Baltimore, have been, for many years, engaged on the investigation of the duration of human life and the latest contribution to the study is 'The Ancestry of the Long-Lived', a book which Professor Pearl has produced in collaboration with Miss Pearl. The biological department has been collecting for over ten years family history records for the purpose of this study and from these collections they selected two groups of individuals, one consisting of nonagenarians and centenarians and the other of shorter-lived persons. These two groups are in no sense random samples and the second group has a mean higher age and less variability in age than in the case of a random sample of the general population. This fact emphasizes that the differences shown between the two groups in this study would have been greater if the sample of longevous persons was compared with a similar one taken from the general population. It is, in consequence, safe to assume that the conclusions reached have been proved as they constitute an underestimate of these differences.

The authors have made a new contribution to the study of the problem by suggesting the total immediate ancestral longevity (tial) as the criterion for investigation. It represents the sum of the number of

years lived by the two parents and the four grandparents of each individual in both groups. They have analysed the contributions to tial from various points of view and have shown the importance of ancestral longevity as a definite factor in determining the length of life of the individual. The average age at death of every ancestor of the longevous group is higher than that of the shorter-lived one. In the case of parents this superiority ranges from 20 to 30 per cent and from 10 to 14 per cent in the case of grandparents. It is, at the same time, interesting to note that, among the nonagenarians and centenarians, about 13.4 per cent came from the matings of parents who were not long-lived (70 years and more). Certain facts relating to the families of longevous persons are equally interesting. The infant and general mortality rates are, in these families, definitely lower than in the case of the population of the country or of the shorter-lived series with which the long-lived persons are compared.

The birth place, race stocks and alcoholic habits of the nonagenarians and centenarians are investigated. The proportion of abstainers among them is significantly greater than in a sample of the general population of Baltimore (by about 11 per cent). But the proportion of moderate drinkers is about 4.1 per cent more than in the general population. About 3.7 per cent survived to extreme old age in spite of being heavy drinkers. On the whole, the evidence points to the moderate use of alcohol as being in no way incompatible with longevity, a position which Professor Pearl has already sustained elsewhere.

Apart from the main theme the book presents a large amount of material of great interest to the student of vital statistics. Thus, at the very beginning, the authors set out a table embodying data for several countries of the world showing the expectation of life at birth, the number of survivors at 92 years of age out of a thousand born alive and the expected mean longevity of survivors at 92. India is one of the countries included. The wastage of life in India, as revealed by these figures, is appalling. The expectation of life at birth is only about 23 years as compared with about 60 years for the most healthy community (Kansas, U. S. A., white population). It is true that the latest actuarial report raises the expectation of life in India to about 27 years but the difference is still enormous. As for the rate of survival till the 92nd year of life, Norway leads and India is again at the bottom, Norway having over one thousand times as many male survivors and over 1,500 times as many female survivors as India.

Again, in another comprehensive table, no. 17, the authors have brought together all the available data relating to the variability in longevity of ancestors.

The book is, on the whole, very stimulating reading though, as has been pointed out in the preface, it is not easy for the general reader. Professor Pearl points out that this is only one stage in the general programme

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of investigation of longevity and we look forward to the further studies of the problem.

OPERATIVE SURGERY: THE ABDOMEN AND RECTUM.—By Dr. Martin Kirschner. Authorized translation by I. S. Ravdin, B.S., M.D. 1933. J. B. Lippincott Company, Philadelphia and London. Pp. xiv plus 569, with 395 illustrations (mostly coloured). Obtainable from Butterworth and Company (India), Limited, Calcutta. Price, Rs. 37-8

THE first volume of the American edition of Professor Kirschner's *Operative Surgery* was published in 1931. The enthusiastic reception which it received led to impatience for the appearance of the second volume, but the German edition has been delayed by causes which the author explains in his foreword, so that the translator must be congratulated on the speed with which he has completed his heavy task.

The author's foreword is interesting reading, he tells how his transfer from Königsberg to Tübingen, with the consequent replacement of nearly all his assistants, necessitated devoting more time to the practical work of the clinic, to the detriment of his literary work. How a British surgeon envies these continental professors their staff of trained assistants, who work with them for years and carry out all routine without supervision, but how much better for the training of the general practitioner is the British system!

The distinction of attention involved in the planning of a new surgical clinic at Tübingen and the assumption of the university rectorship will be readily understood by many in this country who have to find time for much administrative and academic work in addition to their teaching and clinical duties. German writers cannot keep off politics for long in these days and, accordingly, we find a reference to the (?) struggle of German science and German books for recognition in the world and a pious hope that this book may contribute to the rehabilitation of the German people, sentiments which make one smile in the light of recent events in that country. However that may be, the book will certainly enhance the already high reputation of its author, for it is a fine work worthily produced and the reading of its lucid descriptions is a real pleasure to the surgeon. It represents continental practice at its best, as expounded by one of the masters (the author has since been transferred to Heidelberg), and one is struck, not so much by the differences between British and American practice and that described, by the fact that technique everywhere appears to be standardized and new methods if adopted at all are adopted in all countries.

The present volume deals with the abdomen, including the rectum, but excluding gynaecological, renal and bladder operations. The opening chapter describes methods in general, before, during and after operation. The author's preference for spinal anaesthesia with solutions of low specific gravity for most abdominal operations is in accord with the trend of opinion in England, where the abdominal relaxation thus obtained and the freedom from after-complications is being more and more appreciated. Except that he prefers a mid-line to a paramedian and describes some incisions across the rectus, especially one which he calls the 'fish-hook' for abdomino-thoracic work, his directions are in accord with standard practice. The method given for enlarging the McBurney incision is not the best, to cut across the external oblique greatly weakens the abdominal wall, the translator in a note indicates a better method. In the second chapter all recognized methods of suturing and anastomosing the intestine are minutely described and beautifully illustrated. We learn that the author has had better results and smoother convalescence since he substituted an interrupted Lambert suture for the almost universally-used continuous suture. He uses linen thread for the sero-muscular suture, as catgut, with the exception of the traumatic eyeless needles which are too expensive in

Germany, tears too large holes, as most of us have found. The Petz suture instrument is recommended for passing the through-and-through sutures in all terminal closures and in lateral anastomoses where there is sufficient tissue. There is a description and several figures of this interesting instrument, which enables a practically aseptic intestinal anastomosis to be carried out very rapidly, but we are not told whether the metal clips which the machine inserts ever give trouble afterwards in getting out of the body.

The operations on the various sections of the intestinal canal are then taken up *serialim*, each preceded by a brief résumé of the surgical anatomy of the region, and here is one of the few features calling for adverse criticism, for the arrangement of the lymph glands draining the stomach is most inadequately described in six lines and the same applies to the lymphatics draining the caecum, sigmoid and rectum, all regions which are frequently affected by malignant disease. The usual method of anaesthesia is by a combination of spinal and splanchnic anaesthesia, the solution of novocaine for the latter being injected into the retro-peritoneal tissues by a high pressure apparatus. The operations described are those practised in England, with the decided preference of the Austro-German school for stomach resection in both gastric and duodenal ulcer cases, in order to remove most of the acid-secreting mucous membrane. Actual or anticipated obstruction at the pylorus is the only condition for which gastro-enterostomy is recommended as the operation of choice. There is a most excellent section on post-operative gastro-jejunal ulcer, with full descriptions of these difficult operations. Attention is drawn to the difficulties in which a very short afferent loop will land the surgeon in the event of a gastro-jejunal ulcer subsequently requiring operation. For this and other reasons the author habitually uses a rather longer loop of jejunum in resection or gastro-jejunostomy than is usual in England and America. Perforation of gastric and duodenal ulcer is dealt with in the next chapter and gastro-enterostomy is advised in all cases after suture; alternative methods are given for dealing with cases where suture is impracticable.

The following chapters deal with operations on the small and large intestine and for peritonitis and obstruction on the usual lines, but the author does not advise crushing the stump of the appendix, at any rate in acute cases. In the article on megacolon it is surprising to find no mention of the huge volume of recent work on abdominal sympathectomy in the treatment of this condition, so the translator supplies a description of the operation of resection of the pre-sacral nerve with an illustration. The chapter of sixty pages on the various methods of extirpation of the rectum for carcinoma is one of the most concise and lucid to be found in any book, the clear illustrations in the general discussion of the different types of operation obviate any confusion in following the actual descriptions.

The last section of the book deals with the biliary system and in an otherwise excellent description of the anatomy of the parts it is surprising to find no mention of Hartmann's pouch, which plays such an important part in the symptomatology of gallstone cases by obstructing the outlet of the gallbladder. The author is opposed to drainage of the common bile duct except in severe infectious jaundice, long-standing cases with severe damage to the liver cells, acute pancreatitis and injury cases. After exploration of the common duct he sutures it completely when the passage to the duodenum is patulous, if there is an obstruction he establishes an internal fistula between the bile duct and the duodenum, even in infected cases and claims that the results are superior to those obtained by the usual practice of external drainage. The sections on biliary fistula, injuries to the bile ducts and operations for recurrence of symptoms are particularly good.

The text throughout is written in the most lucid style and high praise is due to the translator for his excellent rendering, though his habit of interpolating

his comments and particulars of his own practice in brackets is irritating, especially when, as on p. 473, we find on turning the page that the author himself deals with the point. After all the book is an exposition of Professor Kirschner's teaching and the reader wishes to learn what his methods are and his reasons. As such the work is the most noteworthy contribution to surgical literature which has appeared in recent years and should be read by all surgeons. Especial mention must be made of the three hundred and ninety-five superb illustrations, mostly in colour.

W. L. H.

THE MANAGEMENT OF FRACTURES, DISLOCATIONS, AND SPRAINS.—By John A. Key, B.S., M.D., and H. E. Conwell, M.D., F.A.C.S. 1934. The C. V. Mosby Company, St. Louis. Pp. 1164, with 1,165 illustrations. Price, \$15.00

The authors state in the preface that 'this book is written for the student, the general practitioner and the surgeon'. It is doubtful whether the medical student of to-day with the crowded curriculum will have the time to give to a book of this size. It is a matter of regret that he cannot.

As a reference book for the general practitioner and more especially for the surgeon this work should prove of great value. Two chapters deserve special mention, each of which has been written by a specialist. In chapter XI there is a masterly description of brain trauma associated with fractures of the skull written by the late Dr. C. E. Dowman.

Fractures of the jaws and related bones of the face is given very fully by Dr. J. B. Brown and contains all the recent methods of treatment. All the recent operative procedures find a place in the book. The work of Boehler is extensively mentioned. British methods of treatment are omitted in certain parts, e.g., Robert Jones' methods of reducing a Colles' fracture and a supra-condylar fracture of the humerus are not mentioned.

In the treatment of compression fractures of the spine Watson Jones' procedure finds no place although it is much simpler to carry out than Davis' method.

In describing the reduction of a dislocated shoulder by Kocher's method, extension is mentioned. Extension was not used by Kocher but is a modification of his method. Manipulation is not mentioned in the treatment of tennis elbow, although practised with much success by manipulative surgeons.

The illustrations are good but several skiagrams are not very clear owing to the reduction in size.

The book is well printed and has heavy-type headings.

We feel sure that this book will be in great demand as it justly deserves.

F. J. A.

AIDS TO OSTEOLOGY.—By P. Turner, B.Sc., M.B., M.S. (Lond.), F.R.C.S., in collaboration with N. L. Eckhoff, M.S. (Lond.), F.R.C.S. Third Edition. 1934. Baillière, Tindall and Cox, London. Pp. vii plus 222. Price 4s. 6d.

THIS small book is one of the well-known *Students' Aids Series*. An attempt has been made to use a standardized nomenclature, and that recommended by the Anatomical Society has been adopted. The well known names which have been changed and which are still in use in surgery might have been placed in brackets after the new names, for example, in a recent book on fractures the following are not found in the index—Talus—Calcaneus. This causes much confusion in the minds of students beginning surgical work.

The necessity of such a book as this is a matter of opinion, that there is a demand for it is shown by a third edition. A master mind only could assimilate the contents of such a book which contains no diagrams nor figures. Teachers of anatomy will certainly not

recommend such a book even as a final 'refresher' before an examination.

F. J. A.

GNOCOCCAL INFECTION: RECENT ADVANCES IN PATHOLOGY, DIAGNOSIS AND TREATMENT.—By R. V. Storer, M.R.C.S. (Eng.), L.R.C.P. (Lond.). 1934. John Bale, Sons and Danielsson, Limited, London. Pp. x plus 91. Price, 7s. 6d.

This is a short monograph which is divided into three parts, biology of the gonococcus; the identification of the gonococcus and the eradication of the gonococcus.

There is a foreword by Kenneth M. Walker.

It is difficult to determine exactly for whom this small book was written. If for the general practitioner, then the sections on cultivation, etc., of the gonococcus could have been omitted. If for the venereologist the space allotted to treatment is too small.

This monograph is however well worth reading by all general medical practitioners for the emphasis that is laid on the tests of cure, and the importance of this being done before marriage.

F. J. A.

MODERN ADVANCES IN DISEASES OF THE THROAT.—By A. Miller, F.R.C.S. (Edin.), D.L.O. 1934. H. K. Lewis and Company Limited, London. Pp. xii plus 120, with 1 coloured plate, 40 illustrations in the text and 2 tables. Price, 10s. 6d.

In this beautifully produced and illustrated book of 115 pages dealing chiefly with the tonsils, the author gives a clear account of the modern methods of removal of the tonsils, and has gathered into this single volume all the recent work on tonsil surgery.

It is well arranged and easy to read. The advice given is sound and practical and the illustrations are excellent. Fourteen pages are devoted to adenoids and a good account is given of the use of the La Force adenotome. Apart from this very little is said about other throat conditions. More might have been written about abnormal forms of peri-tonsillar abscess, and more emphasis laid on the supra-tonsillar fossa method of opening them.

The first part is so well done that one feels disappointed with the latter part and hopes that this may be remedied in later editions.

A full and useful list of references is given. It is a book that should prove of great value to post-graduates and practitioners interested in the tonsil-adenoid problem, and should find a place in every medical library.

A. D.

ALLERGY IN GENERAL PRACTICE.—By S. M. Feinberg, M.D., F.A.C.P. 1934. Henry Kimpton, London. Pp. xv plus 339. Illustrated with 23 engravings and a coloured plate. Price, 21s.

It is a practical book on the subject of allergy for the use of general practitioners. All the technical and controversial points have been carefully avoided. Practically the whole of the book has been taken up by the discussion of asthma and hay fever; the important subject of allergic conditions of the skin has been dismissed within seven pages only. Gastro-intestinal allergy, allergic headaches, and other possible allergic conditions have been very briefly considered. The predisposing causes of allergy have been briefly discussed but no reference has been made to the important work of Barber and Oriel and others which point to the presence of liver dysfunction in the allergic individuals. In the opinion of the author 'allergy is probably relatively uncommon among Indians, Japanese, Chinese, and native South Americans'. The reviewer can corroborate these views as far as the question of allergy amongst the Indians is concerned.

The chapter on the diagnosis of asthma is very well written and should prove useful. The value and importance of a good history in the diagnosis of asthma

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is duly emphasized and the subject of history-taking is dealt with in a practical way. An outline of the important points to be elicited in a patient's history is given and the significance of the facts obtained is discussed. A comprehensive list of specific substances (allergens) liable to cause asthma in allergic individuals is given under different headings. The author has not simply mentioned these allergens but has given a list of common foods, preparations and materials in which a particular substance may be found and which may be the cause of allergic symptoms. For example an individual sensitive to wheat will be sensitive to all preparations in which wheat is found and the author has given names of no less than thirty-five such preparations. Similarly a person sensitive to egg may be sensitive to all the preparations of egg and the patent foods such as Ovaltine and Cocomalt which contain egg. This detailed information about the allergens should prove of practical value.

The type of asthma which is most common amongst Indians and which is due primarily to bronchial infection has not been treated at all as the author insists on calling it 'asthmatic bronchitis' and differentiates it from asthma proper. A better plan would have been to divide asthma into allergic and non-allergic types, the latter type including the asthma due to bronchial infection. The author's plan to exclude this non-allergic type of asthma is responsible for such statements in the text as 'tuberculosis is uncommon in this group of individuals', in the sputum 'probably the most constant microscopic finding is the presence of large numbers of eosinophiles', and in the blood 'the most constant finding is an eosinophilia'. Evidences of healed and active tuberculosis are quite commonly found in the non-allergic type of asthma and sputum and blood eosinophilia is to be found only in a minority of cases.

D.

DISEASES OF WOMEN.—By Ten Teachers. Edited by C. Berkeley, J. S. Fairbairn and C. White. Fifth Edition. 1934. Edward Arnold and Company, London. Pp. xii plus 668. Illustrated. Price, 18s.

The fifth edition of the above book makes a welcome appearance.

The ten contributors are representatives of the London schools. Each contributor has written one section and the Editorial Committee has endeavoured with success to co-ordinate the different views into one homogeneous whole. Each section is lucidly written, the illustrations are profuse and easy to follow. Eight very beautiful coloured plates are included.

Thorough revision has brought the book up to date and a new chapter on ovarian hormones gives a clear account of this important subject.

Two valuable chapters on abdomino-pelvic pain and chronic ill health in women from the psychological aspect are also included. Both these chapters deserve special study by students and practitioners.

For clarity of expression, omission of redundant theories and ease in reading, there are very few textbooks on diseases of women comparable to this book. It is specially valuable for students who nowadays are unable to digest the large type of textbook. The book is well printed and indexed.

S. N. H.

HANDBOOK OF THERAPEUTICS.—By D. Campbell, M.C., M.A., B.Sc., M.D., F.R.F.P.S. Second Edition. 1934. E. and S. Livingstone, Edinburgh. Pp. xx plus 444. Illustrated. Available from Messrs. Butterworth and Company (India), Limited, Calcutta. Price, Rs. 9-6

The progress of medicine has been so rapid that in four years, since the appearance of the first edition, new work has necessitated a considerable degree of revision and affected almost every chapter. The author has added a good deal of new material and brought it

up to date. The opening sections deal with management of patients, various therapeutic measures and physical method of treatment. The arrangement adopted in the subsequent chapters has been in the main to group the diseases anatomically. The sections on cardiac affections and sprue, use of nirvanol in chorea, atabrin in malaria, cortical extracts in Addison's disease, ketogenic diets in septic infections of the urinary passages and in epilepsy, carbon dioxide as a respiratory stimulant in the treatment of asphyxia and whooping cough, deserve to be specially mentioned. The author has dealt with all these subjects in a critical spirit and has left out unnecessary details. Treatment, while less full, is in no case inadequate.

The book is not overburdened with illustrations, which is an advantage, while those given are very helpful. The printing and general get-up is all that can be desired and it should take its place along with others of its kind in the library of the practising physician.

R. N. C.

VEGETABLE DRUGS OF INDIA.—By D. Sanyal, L.M. & S. (Cal.), and R. Ghose, M.B. (Cal.), D.T.M. & H. (Bengal)*. Second Edition. 1934. Published by S. Chatterjee. The Medical Publishers, Calcutta. Pp. 590 plus xxiv. Price, Rs. 4-8

This edition has been an effort to a greater improvement of the original volume. The drugs have been arranged and classified according to their action on different systems of the human body. The authors have tried to describe the action of the indigenous drugs in a method similar to modern books on materia medica. The physical characters, chemical composition and the uses in the indigenous systems have been briefly discussed. Free reference has been made to (1) Watt's *Dictionary of Economic Products of India*, (2) *Indigenous Drugs of India* by K. L. Dey, (3) *Dymock's Pharmacographia indica*, etc., but some of the recent literature appears not to have been so freely consulted.

The book is well got up. It is written in simple and clear English and can be easily understood. In our opinion the book may be of help to the local practitioners and students who wish to make use of indigenous drugs in their clinical practice.

R. N. C.

MANUAL OF DETERMINATIVE BACTERIOLOGY.—By D. H. Bergey. Fourth Edition. 1934. Baillière, Tindall and Cox, London. Pp. xvi plus 664. Price, 27s.

SINCE its first appearance in 1923 this well-known manual has been of great value to bacteriologists and has been a book of constant reference in many laboratories where cultural work is done. This book is now in its fourth edition and has been brought up to date and several material alterations have been introduced in the nomenclature. We are glad to see that *Br. melitensis* and *Br. abortus* have been removed from the genus *Alcaligenes* and placed in the newly recognized genus *Brucella* in the Tribe Bacterica. The genus *Pfeifferella* has been combined with the genus *Actinobacillus* and the description and definition of several genera have been amplified. Descriptions of about 50 new species have been included and what is perhaps more important is that several organisms have been omitted as distinct species and the names recognized as synonyms for other well-known species. Another very valuable feature of this present edition is a brief yet comprehensive discussion on the principles of taxonomic work.

In addition to this book being the only authoritative work on the nomenclature of organisms which obeys the international rules for nomenclature, it contains an

* The degree D.T.M. & H. (Bengal) does not exist: this should presumably be D.T.M. (Bengal).—EDITOR, I. M. G.

enormous mass of information about individual species. It is a book that should be in the hands of every bacteriologist. Workers who are familiar with the previous editions will welcome this new edition while those who have not used this book in their laboratories will find it a most useful encyclopædia of information always handy in the laboratory. It is the best 'key' for the identification of organisms of the class Schizomycetes.

C. L. P.

THE ESSENTIALS OF PHYSICAL DIAGNOSIS.—By R. W. Buck, M.D. 1934. W. B. Saunders Company, Limited, London and Philadelphia. Pp. 259. Illustrated. Price, 12s. 6d.

It would appear to be paradoxical that in an age when we rely less and less on physical diagnosis the number of books which purport to deal only with this subject alone should be increasing so rapidly. However, a little thought will show that the paradox is only apparent; the details of physical examination are perhaps not being omitted from the textbooks of to-day, but they are at least being swamped by other matter, so that, in order to impress on the student that the art of physical diagnosis is the first art for the embryo physician to master, it is necessary to provide him (or her) with a special book on the subject.

This book comes from the United States, the home of most of the books of this kind. It is difficult to criticize it in detail; it enjoys the qualities and suffers the defects of its origin, that is to say, it is very complete, but not always discriminating. Some of the names attached to different 'signs' will be unfamiliar to both British- and Indian-qualified medical men.

On the whole the book fulfils admirably the purpose for which it was written, and we can recommend it to the student.

A TEXTBOOK OF NEUROPATHOLOGY.—By Arthur Well, M.D. 1934. Henry Kimpton, London. Pp. viii plus 335, with 260 illustrations. Price, 25s.

In this book the author has made an effort to treat his subject as a pure science. He has not only confined himself to the discussion of microscopic and naked-eye pathology, but has also dealt fully with the chemical and physical aspects of disease of the nervous system. Useful sections are appended dealing with preparation and staining methods, and a comprehensive bibliography is given.

Although the descriptions and excellent reproductions will recommend the book to the specialist and research student, it is doubtful whether it will appeal to the general practitioner. Few clinicians will turn to a work on pure pathology when in difficulty. Its value would perhaps be enhanced if some attention were paid to the interrelation of the pathological findings with the symptoms observed at the bedside.

J. C. D.

A HANDBOOK OF MODERN PHYSIOLOGY.—By R. K. Pal, M.Sc., M.B. (Cal.), D.Sc., M.R.C.P. (Edn.), F.R.S.E., and A. Chakravarti, B.Sc., M.B. (Cal.), M.R.C.P. (Edn.). 1934. The Book Company, Limited, Calcutta. Pp. xiv plus 596. Illustrated. Price, Rs. 7-8

THIS is a summary on the ever-advancing subject of physiology and it is not intended to replace the bigger textbooks. In some places the description is too concise and requires a little elaboration. Yet it contains much useful and up-to-date information and will assist students in preparing for examinations in physiology. The inclusion of brief notes on applied physiology enhances its value. The treatment of chemical aspects are comprehensible and not laborious. Some printing mistakes have been admitted. The paper and printing are satisfactory.

P. D.

A SYNOPSIS OF REGIONAL ANATOMY.—By T. B. Johnston, M.B., Ch.B. Third Edition. 1934. J. and A. Churchill Limited, London. Pp. xxiii plus 460, with 11 illustrations. Price, 12s. 6d.

THE usefulness of this edition of the book has been increased by the addition of the section on osteology, so that the book is now complete in itself. The author in dealing with all the sections has avoided unnecessary anatomical details which tax the memory of students of anatomy, but at the same time by printing them in italics has given prominence to the facts which have a surgical bearing and should be carefully studied. In the description of the muscles the main attachments and actions have been concisely mentioned so that they can be more easily remembered by the student. The relations of the important blood vessels have been carefully given. The section on the nervous system has been revised to include all up-to-date information on the subject. The revised British nomenclature of anatomy, as approved by the Anatomical Society of Great Britain and Ireland, has been used throughout the book with advantage and will be much appreciated on account of its simplicity. A glossary showing the approved changes in the British nomenclature of anatomy has been appended for reference. The book is admirably suited for revision work for which it is intended.

N. P.

MEDICAL ELECTRICITY FOR MASSAGE STUDENTS.—By Hugh Morris, M.D., D.M.R.E. 1934. J. and A. Churchill, Limited, London. Pp. x plus 387, with 103 illustrations. Price, 15s.

THIS work is intended for students doing the course in medical electricity for the examination of the Chartered Society of Massage and Medical Gymnastics.

The author is to be commended for the simple and lucid manner in which he has set forth his facts.

The first portion of the book deals with the elementary principles of electricity. This is followed by the application of these principles in electro-diagnosis and treatment.

The section on treatment is particularly good. The book has an added interest in a series of brief biographies of people prominently connected with the science. It also has an excellent glossary of terms commonly used and an adequate index.

It seems a pity not to have included any section on diathermy even though this subject is only included in the second part of the examination. Also in further editions the author could with advantage include some larger scale drawings of motor points and make these more complete.

We warmly commend the book to nurses and technicians who have to deal with this branch of medicine. Budding electro-therapists will also find much of interest and value to them.

G. G.

Abstracts from Reports

BENGAL PUBLIC HEALTH REPORT FOR THE YEAR 1932. BY R. B. KHAMBATA, D.P.H., DIRECTOR OF PUBLIC HEALTH, BENGAL

THIS report although somewhat late in making its appearance must be of interest to a large section of the medical profession. The report covering some 200 pages contains valuable matter on all aspects of public health in the broadest sense of the term. Below is an excerpt of some of the salient points of interest.

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Stimulates
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This makes evacuation
Not only easy
But also certain
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A tablespoonful,
Is taken
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15, Sunkurama Cherry Street, Madras; 2, Campbell Street, Karachi; and 189, 32nd Street, Rangoon.

VITAL STATISTICS

Estimated population.—The estimated population of Bengal for the year 1932 and the birth and death rates calculated thereon are given below :—

The population of Bengal according to the census of 1931 is 49,901,080. The estimated mid-year population for the year 1931 is calculated to be 50,046,202 (excluding migration) according to the 'natural increase' method. By the same method, the mid-year population for 1932 is estimated to be 50,243,355, and the birth and the death rates per mille are to be 26.4 and 20.3, respectively, as against 26.6 and 20.5 calculated on the census population of 1931.

It will be seen that the birth rate in Bengal is the lowest compared with that of other provinces. The death rate on the other hand is, as in 1931, higher than that of Burma, Assam and North-West Frontier Province, but lower than that of the remaining provinces. The rate of natural increase was 6.1 com-

1932 was 691,737 males and 636,597 females, or a total of 1,328,334 against 722,094, 666,125 and 1,388,219, respectively, in 1931. The birth rate is 26.6 per mille of population in 1932 against 27.8 per mille in 1931. Thus during 1932 the birth rate shows a decrease of 1.2 per mille of population as compared with the corresponding figures for 1931. The birth rate is 26.6 per mille in the previous quinquennium and is the same in 1932. The number of males born to every 100 females in 1932 was 108 and in 1931 the corresponding figure was also 108.

DEATHS AND DEATH RATES

Provincial deaths and death rates.—During the year 1932, 1,022,219 deaths were registered in the province, representing a death rate of 20.5 per mille from all causes. The corresponding figure for the year 1931 is 1,113,312 or 22.3 per mille and 22.6 during the previous quinquennium. The death rate of 1932 was reduced

Comparison of Bengal vital statistics with those of the other provinces

Provinces	Birth rate per mille of population for the year 1932	Death rate per mille of population for the year 1932	Rates of natural increase + or decrease — per mille, 1932	INFANT MORTALITY RATES PER MILLE CALCULATED ON THE NUMBER OF BIRTHS REGISTERED DURING THE YEAR 1932		
				Male	Female	Total
Bengal Presidency ..	26.6	20.5	+ 6.1	184.8	172.4	178.9
Madras Presidency ..	36.03	21.96	+ 14.07	193.62	171.78	182.58
Bombay Presidency ..	35.89	23.04	+ 12.85	164.01	148.12	156.39
United Provinces ..	34.66	22.23	+ 12.43	169.16	155.49	162.72
Punjab ..	41.36	24.70	+ 16.66	182.80	173.72	178.52
Central Provinces ..	45.20	26.89	+ 18.31	215.16	186.40	201.12
Bihar and Orissa ..	33.8	20.6	+ 13.2	138.2	119.0	128.8
North-West Frontier Province.	28.89	20.00	+ 8.89	129.93	128.57	129.34
Burma	27.75	17.30	+ 10.45	196.64	171.85	184.50
Assam	30.06	18.96	+ 11.10	166.05	146.51	156.58

pared with 5.5 per mille in 1931. The infant mortality rate was lower than that in Madras Presidency, Central Provinces and Burma, but higher than that in the others.

BIRTHS AND BIRTH RATES

Provincial births and birth rates.—Excluding still-births, the number of children born during the year

by 8.1 per cent as compared with 1931. It was reduced by 9.3 per cent when compared with the quinquennial figure. It was lowest on record since 1892. 527,968 males and 494,251 females died during the year 1932 while 572,800 males and 540,512 females died during the year 1931. A hundred and six males died to every 100 females. The death rate from various causes is shown below:—

Causes of deaths : death rates per mille

Years	Cholera	Smallpox	Fevers	Dysentery and diarrhoea	Respiratory diseases	Injuries	All other causes	All causes
1932 ..	0.7	0.2	13.8	0.8	1.2	0.4	3.3	20.5
1931 ..	1.6	0.2	14.7	0.9	1.2	0.4	3.3	22.3
Percentage of difference	— 56.3	±	— 6.1	— 11.1	±	±	±	— 8.1

Mortality according to class.—Classified according to class, 551,690 Mussalmans, 439,495 Hindus, 2,327 Christians, 3,114 Buddhists and 25,593 other classes died during 1932, the death rate for Hindus being 20.4 per mille and for Mussalmans being 20.1 per mille. During 1931 the death rates of 21.8 and 22.3 per mille, respectively, were returned against Hindus and Mussalmans. It will thus be seen that the death rates in 1932 both for Hindus as well as for Mussalmans are the lowest on record since 1911.

Mortality according to age.—The death rate for every age period was reduced in 1932 compared with that during the previous year except in the case of the periods under one year. In the age periods 10 to 15 and 15 to 20 years the decrease amounted to 13.0 and 14.1 per cent, respectively.

STATE OF PUBLIC HEALTH IN THE PROVINCE AND THE HISTORY OF CHIEF DISEASES

Cholera.—Cholera claimed 33,910 deaths in 1932, giving a death rate of 0.7 per mille against 79,073 deaths and a rate of 1.6 per mille in 1931, thus showing a decrease of 56.3 per cent.

SMALLPOX

Smallpox claimed 7,910 victims in the province in 1932 against 9,207 in 1931. The death rate was 0.2 per mille in 1932 being the same as in 1931, and 0.5 the mean of the previous five years, showing a reduction of 60.0 per cent against the latter, being stationary in the former. Smallpox was responsible for 0.77 per cent of the total provincial mortality against 0.83 in 1931. One thousand nine hundred and ninety-five villages out of 86,360 were affected with smallpox in 1932 compared with 2,332 in 1931.

FEVERS

Deaths from fever numbered 691,513 in 1932 against 731,784 in 1931. The death rates from fever were 13.8 per mille in 1932, 14.7 in 1931 and 14.7 during the last quinquennium. The fever death rate in this year was thus reduced by 6.1 per cent compared with the previous year as well as the last quinquennium. Excepting kala-azar in which the death rate was a little higher than that of the previous year, there was a general reduction in all other kinds of fever in 1932. Fevers accounted for 67.6 per cent of the total provincial mortality against 65.7 per cent in the previous year.

Kala-azar.—Ten thousand seven hundred and twenty deaths were registered from kala-azar in 1932 with a death rate of 0.21 per mille. Six hundred and forty-six deaths were returned from towns, of which 241 occurred in Calcutta, and 10,074 from the rural areas. Compared with 1931, the death rate in all Bengal towns decreased by 10 per cent and in Calcutta by 16.7 per cent. In rural areas the number of deaths increased by 571, the death rate having increased by 5 per cent. Twenty-five towns returned rates above the provincial urban average (0.18), the highest mortality from kala-azar with 1.0 per mille each having been registered in the Kalna (Burdwan district) and Chandrakona (Midnapur district) municipalities. Out of 118 towns 46 did not record any death from kala-azar. Kala-azar accounted for 1.55 per cent of fever deaths and 1.04 per cent of the total provincial mortality against 1.39 and 0.92 per cent, respectively, in 1931.

Enteric fever.—Compared with the previous year, the death rates from enteric fever in 1932 showed a decrease of 20 per cent in the whole province with a decrease of 25 per cent in the rural areas. But an increase of 14.3 and 10.2 was recorded, respectively, for Calcutta and the urban areas.

Measles.—The provincial death rate from measles in 1932 was 0.01 against 0.06 in 1931. It was stationary in towns, but decreased in the rural areas by 33.3 per cent and increased in Calcutta by 25 per cent. Only five towns returned rates above the provincial urban average (0.7 per mille). No death from measles was reported from 87 out of 118 towns in the province. Measles accounted for 0.3 per cent of fever deaths and 0.2 of the total provincial mortality against 0.4 and 0.3 per cent, respectively, during 1931.

DYSENTERY AND DIARRHŒA

The total number of deaths reported from dysentery and diarrhœa in 1932 was 39,562 with a death rate of 0.80 against 42,764 deaths with a death rate of 0.86 in 1931. The death rate thus decreased by 7 per cent against the previous year rate and increased by 14.3 per cent against the last quinquennium average (0.7). Twenty thousand seven hundred and forty-six males and 18,816 females died from this disease. Taken separately, dysentery accounted for 21,539 and diarrhœa 18,023 deaths in 1932 against 24,014 and 18,750, respectively, in 1931, the corresponding ratios being 0.4

Analysis of fever deaths in 1931 and 1932.

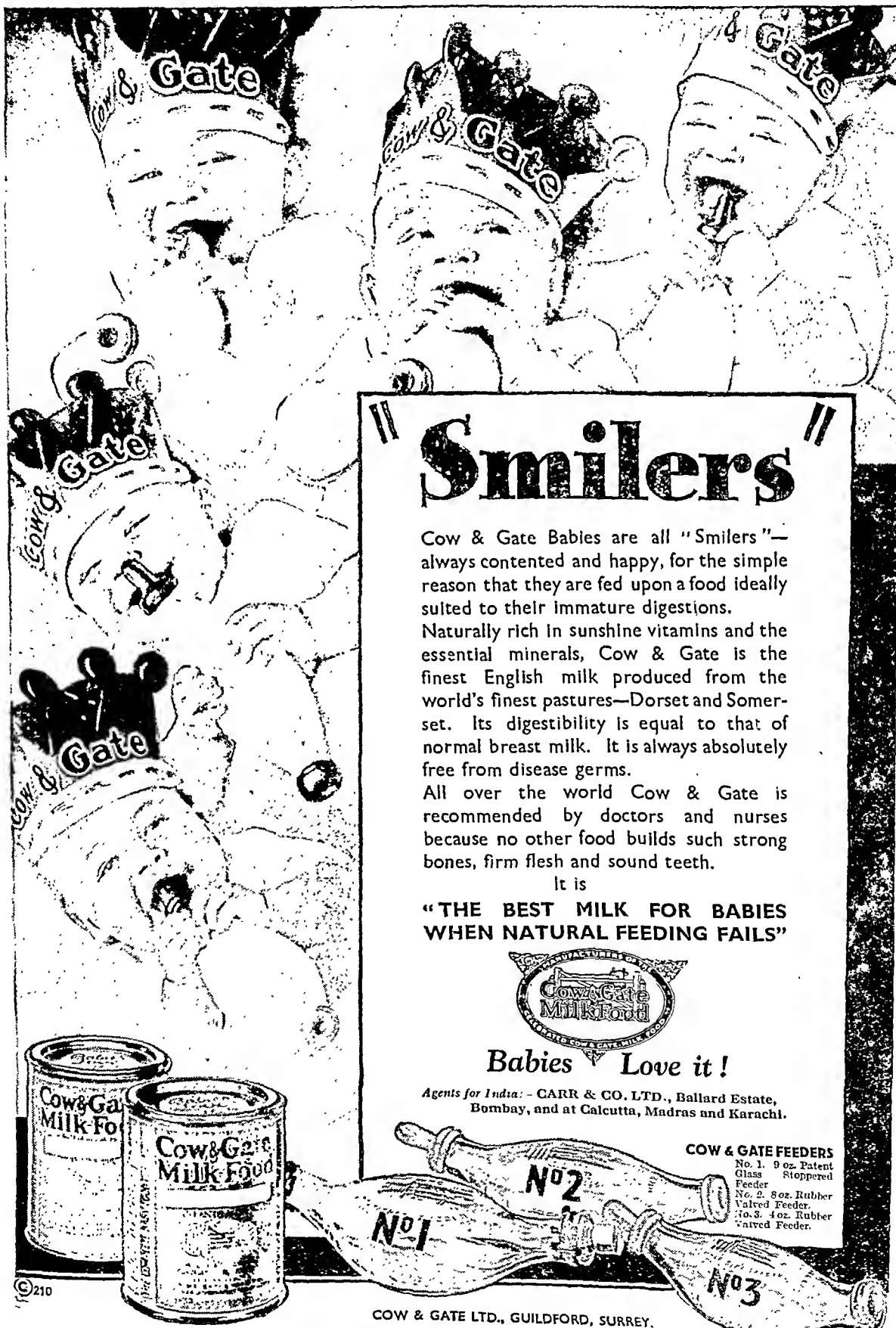
Causes	Number		Death rates per mille		Percentage of increase + or decrease — in 1932	Percentage of total fever mortality	
	1931	1932	1931	1932		1931	1932
Malaria fever ..	349,111	327,386	7.0	6.6	— 5.7	47.7	47.3
Enteric fever ..	12,608	10,176	0.25	0.20	— 20.0	1.7	1.5
Relapsing fever	5,705	4,357	0.11	0.08	— 27.3	0.8	0.6
Measles ..	2,954	2,442	0.06	0.04	— 33.3	0.4	0.3
Kala-azar ..	10,199	10,720	0.20	0.21	+ 5.0	1.4	1.6
Other fevers ..	351,207	336,432	7.0	6.7	— 4.3	48.0	48.7

Quinine consumption.—9,031.3 pounds of quinine were consumed in 1932 against 7,835.5 pounds in 1931. Burdwan, Bankura, Hooghly, Howrah, Calcutta, Khulna, Jalpaiguri, Darjeeling, Rangpur, Dacca, Mymensingh, Bakarganj, Chittagong, Noakhali and Tippera showed increased quinine consumption, although in the Dacca and the Burdwan district the fever indices had fallen in the year under report. Quinine consumption was less than that in the preceding year in the districts of Nadia, Jessore, Dinajpur and Malda, although the fever indices had risen in them during the year. The average consumption per head of population was highest in Chittagong.

and 0.4 against 0.5 and 0.4, respectively, in 1931. Dysentery and diarrhœa accounted for 3.37 per cent of total deaths against 3.84 in 1931.

RESPIRATORY DISEASES

Respiratory diseases were responsible for 62,249 deaths in 1932 with a death rate of 1.2 per mille against 62,351 and 1.24 per mille, respectively, in 1931 showing a decrease of 102 deaths only, i.e., a decrease of 0.16 per cent. The death rate was higher by 24.0 per cent than the provincial quinquennium average. The death rate from pneumonia rose from 0.55 in 1931 to 0.56 in 1932 and those from phthisis and influenza fell from 0.21




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No. 3. 4 oz. Rubber Valved Feeder.

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COW & GATE LTD., GUILDFORD, SURREY.

'BYNIN' AMARA

TRADE MARK

A Powerful Tonic and Hæmatinic

'BYNIN' AMARA is of special value in neurasthenia, particularly when associated with low blood pressure, anæmia and atonic dyspepsia ; in convalescence it gives that impetus which often enables the system to overcome the aftermath of disease and to recover completely

'Bynin' Amara has important advantages over Easton's Syrup on account of its basis being 'Bynin' Liquid Malt in the place of syrup. The 'Bynin' Liquid Malt, besides having valuable digestive and nutritive qualities is an efficient solvent for the other ingredients and helps to mask their unpleasant taste.

COMPOSITION :

Quinine Phosphate	-	1½ gr.
Iron Phosphate	-	2 "
Nux Vomica Alkaloids	-	equal to Strychnine ⅛ "
'Bynin' Liquid Malt	-	1 oz.

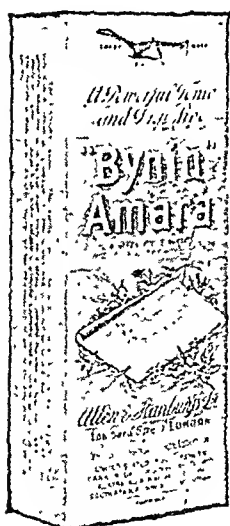
In bottles containing 10 oz.,
20 oz. and 40 oz.

DOSE : 2 to 4 fluid drachms in water twice or
thrice daily after meals.

Further particulars will be sent
on request.

Allen & Hanburys
Ltd,
LONDON

(Incorporated in England)
Clive Buildings, CALCUTTA



and 0.09 in 1931 to 0.23 and 0.07 per mille, respectively, in 1932. The death rate from other respiratory diseases also rose from 0.35 to 0.38 per mille in 1932. 6.09 per cent of total deaths was due to respiratory diseases against 5.60 per cent in 1931.

INFLUENZA

A reduction of 1,249 deaths from influenza against those in the previous year was reported in 1932. The mortality decreased by 1,295 in the rural areas but it increased in all towns by 46, of which Calcutta alone was responsible for 45. In the province the reduction in the death rate was 22.2 per cent, but there was an increase in all towns of 6.2 per cent. There was an increase in the death rate from influenza in Calcutta also by 7.3 per cent, but the reduction in the rural areas was by 33.3 per cent. Influenza deaths were reported from 35 out of 118 towns, in six of which the death rate was above the provincial urban average (0.2).

PNEUMONIA

The total number of provincial deaths from pneumonia in 1932 was 28,153 with a death rate of 0.56 against 0.55 per mille in 1931. There was an excess of 559 deaths from this cause in 1932 over that of 1931. The death rate increased by 9.1 per cent in the rural areas and decreased in towns by 15.1 per cent, of which Calcutta alone had a reduction by 39.7 per cent. The larger mortality from this cause in 1932 was wholly due to rural areas, although there was a reduction in towns including Calcutta. The death incidence from pneumonia having been on a steady rise since the last ten years, nearly three times what occurred in 1923 (10,767), demands special notice and investigation. Only four towns (Jaynagar, Netrokona, Bajitpur and Patuakhali) did not return any death from this cause.

PHTHISIS

General prevalence.—Deaths reported from this cause numbered 11,801 in the province in 1932 showing a decrease of 437 against the previous year. The decrease was wholly due to towns and numbered 472, although there was an increase in the rural areas by 35. The death rates, however, were lower than those in the previous year by 13.2 per cent in all towns and 14.4 per cent in Calcutta. The provincial death rate from phthisis was reduced by 4.2, while the rates in the rural areas remained unchanged. 70.0 per cent of the deaths in all towns occurred in Calcutta alone.

MALARIA

A. ludlowii menace to Calcutta.—There was an epidemic of malaria in the jute mill areas at Budge-Budge in 1930. An investigation was carried out by the Department of Public Health, Bengal, and it was found that *Anopheles ludlowii* were at the root of this epidemic. The mosquitoes were subsequently found to be creating similar havoc on the other side of the river Hooghly at Chengail in the beginning of 1931. As the discovery of the species so close to Calcutta, Budge-Budge being only 12 miles from Calcutta, was a serious threat to the port of Calcutta and the health of the city in general, Government convened a special conference in March 1931 to consider the desirability of carrying on a proper investigation into the *ludlowii* position in the vicinity of Calcutta. A survey party with an entomologist at the head was sanctioned and a further investigation was started in May 1931. This survey revealed the breeding of *A. ludlowii* mosquitoes in other areas as well, for instance in Uluberia on the Bengal Nagpur Railway, the tract along the river Bidyadhari from Port Canning to Champahati, Taki, Basirhat, Hasnabad, Falta, and the neighbouring villages. In April 1932, the village Nabasan about five miles from the Salt Lake area was also found infested. Then, the Salt Lake itself to the east of the city was actually found to be involved in *ludlowii* breeding. In December 1932, *A. ludlowii* were discovered at Nawapati, Mahishbathan and Kristopur, all

situated within 4 to 5 miles from the municipal limits of Calcutta. During this period the transportation of *A. ludlowii* mosquitoes to the city by trains and country boats was also established. Adult mosquitoes of this species were frequently caught from trains at Howrah, Majherhat and Shambazar stations belonging to the different railways. Adults were similarly found to be carried by country boats at Kristopur.

ANNUAL REPORT OF THE BERRY WHITE MEDICAL SCHOOL, DIBRUGARH, ASSAM, FOR THE YEAR 1933-34. BY COLONEL J. P. CAMERON, C.S.I., C.I.E., V.H.S., I.M.S., INSPECTOR-GENERAL OF CIVIL HOSPITALS, ASSAM

The following are a few excerpts from the report which will give one an idea of the general progress and condition of the school:—

The lack of funds continued to handicap seriously the expansion of the school in many directions, but various minor improvements were carried out.

The arrangement proposed last year to treat Police sick in the Civil Hospital and utilize the Police Hospital buildings for hostel purposes was not brought into operation. The Police insist upon having self-contained hospital accommodation provided apart from the general wards, and if funds can be made available, this is to be done. The scheme as previously suggested will then be carried out, and the additional hostel accommodation required will be available.

The only building improvements undertaken during the year were annual repairs to existing buildings, a few minor alterations and additions in the wards of the Civil Hospital and the linking up of one of the students' dining halls with the kitchen by a covered passage.

The Superintendent has brought to notice various requirements necessary for adding to the efficiency of the school. These will be met in order of urgency as funds permit.

A considerable sum was spent last year in providing instruments and appliances which were found necessary. Additional expenditure will have to be incurred this year in purchasing equipment for the physiological department.

Sanction was accorded during the year to the appointment of additional demonstrators in pathology and anatomy to take effect from the current financial year. These appointments will enable practical instruction in these subjects to be carried out more efficiently.

The question of improving practical instruction in public health and hygiene, by arranging for the Assistant Director of Public Health (Assam Valley) to attend the school for a specified period each year to train the students, is under consideration.

The desirability of deputing assistant surgeons and sub-assistant surgeons selected for teaching appointments for special courses of instruction in their respective subjects to the Calcutta Medical College and Campbell Medical School, respectively, prior to joining their appointments, is also under consideration. This, it is thought, would go a long way to raising the standard of medical education in the school.

Twenty-two labour cases were attended by the senior students during the year, against 17 in the previous year. No headway has been made in the matter of providing a properly equipped female hospital at Dibrugarh, owing to financial stringency. There is some hope, however, of this project going forward this year, as funds are likely to be forthcoming from a private source. The training of students in midwifery and gynaecology is greatly handicapped for want of a properly equipped women's hospital, as patients will not come forward freely for treatment under existing conditions.

The x-ray plant has been thoroughly overhauled by Lieut.-Colonel Sen, who is an expert radiologist, and very shortly this section will be quite up to date.

THE HORMONAL THERAPY OF SEXUAL DISTURBANCES

'PRELOBAN'

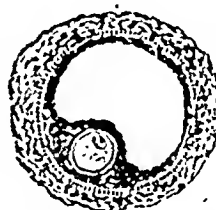


'PROLAN'

Whole gland extract of
anterior pituitary.

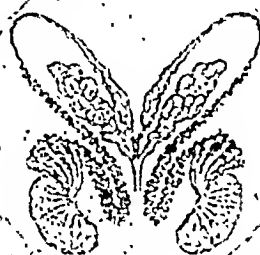
Standardized anterior pituitary
hormone according to Zondek

The superior sexual
hormone dominating
both sexes. To acti-
vate sexual function
in sexual hypoplasia.



Graafian follicle

male generative
apparatus



'ERUGON'

'UNDEN'

Hormonal preparation of the male generative
gland standardized by the capon-comb method.

In all functional disturbances of the
male generative gland, e. g. distur-
bances of potency and premature
senile symptoms.

Standardized ovarian hormone.

For substitution therapy in defi-
ciency or lack of follicle hormone.



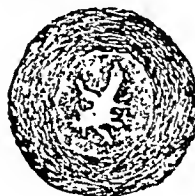
testicular tissue in cross-section



Proliferation stage



Secretion phase



» Bayer «



In no cases were vaccines or any other treatment necessary. Generally three sittings were enough, one every second or third day and, what is more noteworthy, no patients were off work; the pain lasted for about fifteen minutes to half an hour and the patient went back to work with the needle-rack closed up by means of collodion or tincture of benzoin.—Yours, etc.,

K. C. I ANERJEE, M.B.

RELIANCE JUTE MILLS,
BHATPARA, P. O.
(24-PARGANAS),
30th October, 1934.

CALCUTTA MEDICAL COLLEGE CENTENARY
For all past students of the Calcutta Medical College
To the Editor, THE INDIAN MEDICAL GAZETTE

SIR,—In connection with the centenary of the Calcutta Medical College to be commemorated early next year, it is proposed to compile a volume giving a history of the origin and growth of this institution which has played such a large part in offering modern medical education and medical relief during the last 100 years. The compilers have tried their best to get together a connected link of history and progress. Thinking that some old student or their descendants might enlighten us with old records, certificates of merit, or photographs connected with the institution, we take the liberty of appealing to all such gentlemen or ladies to communicate with me indicating the nature of such records.—Yours, etc.,

A. C. UKIL,

Secretary and Convenor,
Centenary Volume Sub-Committee,
Medical College Centenary.

MEDICAL COLLEGE HOSPITALS,
CALCUTTA,
30th September, 1934.

Service Notes

APPOINTMENTS AND TRANSFERS

LIEUTENANT-COLONEL F. R. THORNTON, Civil Surgeon, Ahmedabad, on relief by Lieutenant-Colonel A. H. Harty, to be Civil Surgeon, Dharwar, *vice* Lieutenant-Colonel Shah

Lieutenant-Colonel B. Z. Shah, Civil Surgeon, Dharwar, to be Superintendent of Mahabaleshwar.

Lieutenant-Colonel A. H. Harty, on relief by Lieutenant-Colonel Candy, to be Civil Surgeon and Superintendent, B. J. Medical School and Mental Hospital, Ahmedabad.

Lieutenant-Colonel R. H. Candy to be Civil Surgeon and Superintendent, B. J. Medical School, Poona, on return from leave *ex-India*.

Lieutenant-Colonel C. E. Palmer, Inspector-General of Prisons, United Provinces, is appointed to officiate as Inspector-General of Civil Hospitals and Prisons, Assam, with effect from the afternoon of the 7th January, 1934, until further orders, *vice* Colonel J. P. Cameron, granted leave.

The services of the undermentioned officers of the Indian Medical Service are placed permanently at the disposal of the Government of Madras, with effect from the date mentioned against each:—

1. Lieutenant-Colonel M. M. Cruickshank, 25th February, 1931.

2. Major A. I. Cox, 1st February, 1932.

3. Major J. A. W. Ebdon, 1st February, 1932.

The services of Major R. S. Aspinall are placed at the disposal of the Chief Commissioner, Delhi, for appointment as Civil Surgeon, New Delhi, with effect from the 16th October, 1934.

Captain H. S. Smithwick to be Civil Surgeon, Sholapur.

LEAVE

Colonel J. P. Cameron, C.S.I., C.I.E., V.H.S., Inspector-General of Civil Hospitals and Prisons, Assam, is granted leave on average pay for 1 month and 7 days, with effect from the afternoon of the 7th January, 1935, preparatory to retirement.

PROMOTIONS

Major to be Lieutenant-Colonel

W. J. S. Ingram, M.C. Dated 30th September, 1934.

To be Lieutenant (on probation)

V. M. Albuquerque. Dated 5th June, 1933, with seniority from 5th June, 1932.

Lieutenant (on probation) to be Captain

V. M. Albuquerque. Dated 1st May, 1934.

Notes

ACRIFLAVINE B.D.

Of the flavines, by far the most generally known and widely used is Acriflavine.

Properties.—Acriflavine is a yellowish-red crystalline powder, extremely soluble in water, forming a clear solution which remains bright on the addition of normal saline. Isotonic solutions of Acriflavine can be prepared readily and quickly, and they may be used for injection without filtration.

Solutions of Acriflavine are slightly acid in reaction. For this reason, unless it be at greater dilution than 1 in 1,000, its use is not recommended for intravenous injections, its neutral form, Eusflavine, being preferred.

Solutions of Acriflavine are perfectly stable up to 130°C.; hence, although they are aseptic in the ordinary way, they may be sterilized by heat, if required, without risk of decomposition. They should be stored in amber-coloured bottles, as, under the influence of light, a deposit is gradually formed.

Acriflavine has been tested for bactericidal action against well-known organisms in comparison with other antiseptics, such as mercuric chloride, iodine, silver nitrate and phenol, and it has been proved that unlike other disinfectants the high antiseptic power of Acriflavine is not only undiminished in the presence of serum, but is actually enhanced. In the presence of serum, Acriflavine is 800 times more powerful than phenol, and more than 20 times more powerful than mercuric chloride.

Acriflavine owes its value largely to the fact that it is absolutely non-toxic to the tissues and to phagocytes: thus, when used in the treatment of wounds, Acriflavine does not inhibit the natural healing processes; on the contrary, by creating a powerful antiseptic zone, it actually increases considerably the rate of healing.

At the strength at which it is generally used (1 in 1,000), Acriflavine is only very slightly acid, and it is practically non-irritant even to mucous surfaces.

In the treatment of wounds.—Acriflavine 'B.D.' has become the standard antiseptic for use in wound dressing; for this purpose a 1 in 1,000 solution (in saline or in water) is usually employed, but a much weaker solution is often found to be sufficiently active, a 1 in 100,000 solution being strong enough to kill organisms suspended in serum. On the other hand, a 1 in 500 solution may be applied to injured tissues with perfect safety and without risk of causing pain or any injury to the tissues.

SUCKING DISSECTORS FOR TONSIL ENUCLEATION

By R. R. WOODS, F.R.C.S.I.

THE idea of a tonsil enucleator which also removes the blood from the field of operation is so simple and such a good one in practice that one wonders that it

